NOTES ON LOGIC.

NOTES ON LOGIC:

FOR THE USE OF

Students preparing for Examinations.

WITH A COPIOUS SELECTION OF QUESTIONS IN LOGIC SET AT THE
EXAMINATIONS FOR THE INDIA CIVIL SERVICE, AND AT
THE UNIVERSITIES OF OXFORD AND LONDON.

BY

H. COLEMAN, B.A., Oxon.,

Author of "Notes on Mental and Moral Philosophy."

"Definitio est oratio quæ quid sit id de quo
agitur, ostendit quam brevissime."
Cicero. Ad Brutum Orator. c. 33.

LONDON:

LONGMAN, GREEN, & Co., PATERNOSTER ROW.

MDCCCLXX.

PREFACE.

THIS little work, intended as a sequel to the author's
"Notes on Mental and Moral Philosophy"—for the
favorable reception accorded to which, he begs here to
thank the Tutors of his own and other Universities—
is composed on the same plan, and for the use of a
similar class of readers. The object has been to give
within the briefest compass, consistent with accuracy,
the views of Aristotle—on the science of which he was
the first exponent—and of the most able writers on the
same subject in modern times.

Composed originally for the Author's own Pupils,
chiefly reading for the India Civil Service Examinations,
the work has been used in manuscript for some years,
and during that period he has had an opportunity of
making such changes as experience in teaching might
suggest to be advisable.

These have been chiefly in the way of compression
and excision, for the Author has become daily more
impressed with the conviction that nothing so much
disgusts a Student, and retards his progress, as to

present a new subject to him under a multiplicity of details, and with a variety of terminology. Logic is not an easy subject, neither is Geometry, and yet lads of thirteen, and even adults, with little systematic education, can follow the highly abstract reasoning of Euclid. This is because Euclid states clearly what he means to do at the outset, and performs his task in the fewest words possible. Supposing that he had popularised Geometry, or given a variety of his own theories —what then?

The Author, then, has sacrificed without mercy many a favorite theory of his own, and many a choice passage from approved writers, when experience demonstrated that such information was not required, and therefore a hindrance to students. And so a work originally double the size, became reduced to its present dimensions.

It is hoped that within the compass of these pages sufficient information is given to enable a diligent Student to pass with credit any ordinary Examination in the science, but it is not pretended that the subjects are exhaustively treated, and the Author has always recommended his Pupils, when time permitted, to supplement this work by a careful study of portions of Mr. Mill's able volumes, the clear treatise of Archbishop Thomson, and the excellent notes in Dr. Mansel's edition of Aldrich.

It now becomes his pleasing duty to confess his obligations to other writers who have preceded him,

—obligations he trusts fully acknowledged in the text. The leading place is due to the three works above-mentioned, and then to the volume of Whately, whose treatise is still the best guide in the practical part of the science. He has also consulted, with considerable advantage, the admirable " Essais Philosophiques" of M. De Remusat, and generally most works which have been published on the subject within the last few years. Conscious of many defects in the execution of his plan, the Compiler still ventures to hope that the work will be found to fill a place not yet occupied by any other treatise ; and that it may be used in conjunction with, and not as a rival to, any of the excellent manuals now in the hands of Students.

One word on a practical subject :—The author having observed that foot-notes generally distract the attention of the reader, has not only thrown the larger ones into an Appendix, but also many of those of less dimensions, which, so far as style is concerned, might with more propriety, have appeared at the bottom of the page.

In conclusion, the approbation of the distinguished Professor to whom the work is inscribed, must not be imputed to mean more than the exhibition of a friendly interest in the labours of an old Pupil.

CONTENTS.

❦

b

PART II.

NOTES ON LOGIC.

INTRODUCTION.

I. Absence of any well-established definition as to the aims
   and subject-matter of Logic—Is Logic an Art or a
   Science ?—Views of Whately, Mill, Thomson, Mansel,
   Aldrich—Inquiry into the distinctions between τέχνη and
   ἐπιστήμη—Popular distinction between the two—Views of
   Aristotle—Quotation from Ammonius—ἀρχαι or First
   Principles—Science and Art different stages of the same
   Process.
II. Diversity of opinion on the subject-matter of Logic—
   Views of Whately, Mill, Thomson, Aldrich—Exami-
   nation of the opinions of Aristotle—The Organon—
   Quotation from Ammonius—Logic either essentially con-
   versant with Thought [λόγος ενδιαθέτος] and accidentally
   about Language [λόγος προθορικός] or essentially with
   Language and accidentally with Thought—The first view
   has the weight of authority—Definition of Logic
   usually adopted—Objections—"Laws" an unsuitable
   word to be introduced into Logic—ἐιδη και ὕλη—Proposed
   Definition of Logic in accordance with this Division.

Diversities of Definition of Logic.—The progress of
the student in logic would be greatly facilitated, and
the labour of a writer thereon much abridged, if there
were any well-known and generally accepted definition
of its aims and objects: for in that case, keeping in
view the given definition, his task would be confined
to an analysis and explanation of the processes on
which it was based.

ᴅ

In a subject, too, like logic one might well expect
some agreement as to its scope and subject-matter on
the part of those who have treated of and illustrated
it. It does not resemble an experimental science where
the advancing wave of modern discovery is continually
extending the boundaries, and where long and well-
established theories and systems are continually re-
ceiving rude shocks at the hands of independent
observation. What now would be the value of a
definition of chemistry made fifty years ago?—abso-
lutely nil. Logic, on the other hand, pursues a well-
beaten track, is confined within boundaries defined to
some degree of accuracy, and has undergone little
change since the time of Aristotle.

A Science or an Art?—In attempting a definition
of logic, the very first point—viz., whether it is a
science or an art, or both—has been a subject of
vehement dispute; and the arguments advanced in
support of these different views would more than fill
up the entire space at our disposal. To take the
opinions only of a few English writers : according to
Whately, it is both a science and an art; Mr. Mill,
Abp. Thomson, and Dr. Mansel, though they differ in
many other points, agree in considering it a science;
whilst Aldrich, in his well-known compendium, not
only lowers it to an art, but also to an instrumental
art. By this term instrumental art, Aldrich intended
to refer to a distinction drawn between art pursued for
themselves, called master arts, as music; and those
acquired with an ulterior object : logic, according to
his view, was useful only as furnishing a guide to the
mind when concerned in acquisition of other knowledge,
—hence the use of the word instrumental.

Now in order to avoid increasing at any rate these
diversities of opinion upon this preliminary point of
our inquiry, it will be well to consider what these terms
—science and art—mean, and how far the boundaries

separating them have been accurately defined. The terms ἐπιστήμη and τέχνη are first met with in Plato, but are used by him as synonyms. In Aristotle [Annal. Post. II. i. 4.] we find a distinction laid down, although he has not always conformed to it in practice.

Aristotle on Distinction between Science and Art. —Science, he says, is conversant about that which is certain and fixed [τὸ ὄν] in opposition to Art, which is conversant with production, and it is probable that on a mistaken idea of the meaning of this passage the common definition is founded, viz., that *science is a collection of rules and theories, and art the application of these rules to practice.*

This definition, however, is observed in ordinary usage neither by the learned nor simple, and will not stand the test of examination : take astronomy for instance—is it a science or an art? According to the above definition, the theoretical part would be a science ; the practical, an art—but what constitutes the boundary between the two? Could any one learn the theoretical part without having a certain power to apply it to practice? Or, again, could he be acquainted with the practical, or even mechanical part, without knowing something at least of the theory? Let us examine then a little more closely this definition of Aristotle, and ascertain, if we can, its meaning.

Aim of Peripatetic Philosophy.—The great aim of the peripatetic philosophy, as we learn from Ammonius, was to investigate the ἀρχαι or first principles of things; every art then would have first principles on which it depended, and from which it was a deduction. These would constitute τὰ ὄντα or certainties (as opposed τα φθάρτα perishable things), and form the subject-matter of ἐπιστήμη. The consequences, legitimately deduced from these principles, are arts to which different names are given according to the matter on

which they are employed : the ἄρχαι or first principles
of space applied to the earth, constitute the art of
geometry, and to the heavens, astronomy. Observe,
too, the account given of art in the Ethics, book
vi.—" Every art is conversant with three processes,—
production [γένεσις], contrivance [τεχνάζειν], and
contemplation [θεωρία]: of these three, contemplation
will evidently come first, in accordance with the rule
that what is first in practice is last in the mental
analysis. The first step then is θεωρία or contemplation,
and so in popular language, which sometimes preserves
valuable distinctions forgotten by the learned; we talk
of the theoretical aspect of art. Contemplation, but
of what ?—evidently we say of the first principles
from which each particular art is a deduction. Are
then the terms science and art synonymous ? No, but
they are homogenous and correlevant: the whole
process is one and the same, and ἐπιστήμη and τέχνη
are merely stages of it. The ἄρχαι, or first principles,
must develop themselves into art, and there can be no
art without a previous θεωρία of the principles on
which it depends.

II. **Subject-matter of Logic.**—There is an equal
diversity of opinion on the subject-matter of logic.
According to Dr. Whately, who substantially follows
Aldrich, logic is wholly conversant about language.
He defines logic as *The art and science of reasoning :*
an art in reference to the rules it gives for the right
use of reasoning and the avoidance of fallacies; a
science in reference to the analysis it institutes of the
mental processes of reasoning.

According to Mill, Logic is " *The science of the
operations of the understanding, which are subservient
to the estimation of evidence, both the process itself
of proceeding from known truths to unknown, and all
other intellectual operations, so far as they are auxiliary*

to it." He makes, as it were, a twofold division of truths; one, intuitive, naturally apprehended by the mind; the other, the truths of inference which it is the province of logic to establish.

Abp. Thomson and Dr. Mansel, and the weight of authorities, ancient and modern, define logic as *the science of the necessary laws of thought.* Before examining the opinions of these writers, we propose to endeavour to ascertain those of Aristotle.

The name of logic nowhere occurs in his writings, and is of later introduction. It is derived from λόγος, which may either mean λόγος [ενδιαθέτος] or verbum mentale, or λογος προθορικος, *i.e.,* language.

Organon of Aristotle.—The logical speculations of Aristotle are collected in a work to which the name of "Organon" has been given. The Organon consists of a variety of detached traits, logical, with some considerable mixture of metaphysics and grammar: the connection between these treatises is not always very easy to be perceived, and the order in which they are placed does not rest on the authority of Aristotle, though it is entitled to some weight, as embodying, no doubt, the tradition of the peripatetic school on the subject.

Quotation from Ammonius.—One of his Greek commentators, Ammonius, gives the following account of the system on which the several treatises were placed in their present order. " And so also this philosopher does;" for wishing to make a demonstration he says to himself, I wish to speak about demonstration: now since demonstration is a scientific syllogism, it is impossible for anyone to discourse upon this who has not first described what is a syllogism; and we cannot learn what is a syllogism absolutely without learning what is a proposition, for propositions are certain sentences [λόγοι] and the syllogism is the collection of these sentences; so that without one knows propositions, one

cannot learn the syllogism, for of these it is composed;
nor (can we learn) the propositions without a know-
ledge of nouns and verbs, for of these every argument
is composed; nor verbs and nouns without simple
sounds, for each of these is a sound significative. It
is necessary, then, first to speak of simple sounds.
Here then ends the theory [θεώρια scientific con-
templation] and this becomes the beginning of the
practice: for first he discourses concerning simple
sounds in the Categories, afterwards concerning nouns
and verbs, and propositions in his treatise concerning
Interpretation, then concerning syllogism, simply so
called, in his first Analytics, and finally concerning
demonstration in his latter Analytics,—and the same
writer gives this as the scope and object of the
Aristotleian philosophy. "Now what is the aim of
the philosophy of Aristotle?" We say that it is to
know the first principle of all things,—the effective
cause of all things which acts always and in a similar
manner. [Ammon. page 12, et seq.]

The great aim then of this philosophy, and conse-
quently of the Organon, is to know the first prin-
ciples, or causes. Now, of causes, some belong to
the domain of physics, and others to metaphysics,
with neither of which has logic to do. What, then,
is the subject-matter of logic? [ὕλη] for an inves-
tigation as to this may perhaps teach us what ἀρχαι
are the special province of logic. Now, by the agree-
ment of all philosophers, logic is either adequately
and essentially conversant about thought, [λογος
ενδιαθέτος] and accidentally about language, or essen-
tially and adequately about language, and accidentally
about thought. The second view is opposed to the
weight of authority, ancient and modern, and is ex-
pressly contradicted by Aristotle. [Annal. Post.] The
argument of Dr. Whately, who maintains this opinion
with his usual ability, is barely consistent with itself.

In making the analysis of reasoning the' appropriate'
office of logic, he adopts the first view, and in making
logic entirely conversant about language, the second.

Remarks on Definitions of Mill, &c.—The definition
which Mr. Mill has elaborated with so much skill in
his system of logic, is very suitable to the view he
takes of logic as an inductive science; but without
deciding whether logic may not have an inductive
aspect, the weight of authority is on the side of those
who consider it as mainly a deductive science, and
hence the definition of Mr. Mill would not be suitable.

There remains then, the view advocated by Sir
W. Hamilton, Dr. Thomson, and Dr. Mansel, that
logic is conversant about thought essentially, and about
language accidentally, to which we do not hesitate to
give in our assent; we regard, however, that part of the
definition which speaks of the "necessary laws" of
thought, as open to objection. The term laws in the
first instance is, we think, an unfortunate one to
introduce into the domains of pure logic. What is a
law physically? The constant succession of phenomena
in such an order as may seem to warrant us in predi-
cating of them in the future what we have observed of
them in the past. A law is nothing but a very high
degree of probability, but logic being conversant with
certainties, [τὸ ὄντα] excludes probability altogether. A
law, too, supposes a succession of phenomena appre-
hensible by the senses, but thought is apprehended by
the understanding only. Again, what is the meaning
of the word "necessary?" Are there some laws
which are necessary, and others unnecessary, and if so,
what part of philosophy takes cognizance of the latter?
Instead, therefore, of the terms "necessary laws of
thought," we should prefer forms of thought, having
reference to the capital division made by the ancients of
things as to their form and matter [εἶδος καὶ ὕλη].

The matter of logic we have ascertained to be

"thought," the $d\rho\chi a\iota$ or forms of thought are those first principles of thought which make it to be what it is, which constitute and fashion it so as to be available for the formation of Names and the practical part of logic.

Definition of Logic.—Whether then logic is a science or an art, is, in our view, a point of no practical importance, since either term implies the other; but, as the cause, rather than the effect, should be chosen, our definition of logic *will be the Science of the Forms of Thought, and of their application in language to the social wants of man.*

CHAPTER I.

On the Connexion between Language and Logic.— The close connexion, which, as we have seen, subsists between language and logic, renders some observations on this subject appropriate and necessary.

The vast field for research presented by language is mapped out and divided between Logic, Rhetoric, and Grammar. Whilst Logic institutes an analysis of the forms of thought, and their development in language, Rhetoric looks at speech in its persuasive aspect, and Grammar aims, by an apt classification, to reduce to some order, the varieties of words. All assist and illustrate each other, but the connexion between grammar and logic is of a more intimate description than between the others. Grammar is of two kinds,— universal, which considers the forms of grammar common to all languages; and particular, which in. vestigates the laws and idioms of any particular tongue.

Grammar grew out of logic: the earliest gram. marians were all logicians, and the forms and distinctions of universal grammar are founded upon

purely logical considerations, and cannot be properly understood without some knowledge of logic, which ought to occupy a place in every rudimentary grammar, as has long been the case in French grammars, and which is now becoming common in this country.

In considering this subject, several interesting questions present themselves for elucidation, which we can only briefly touch upon here,—these are as to *its origin, its unity, or multiplicity of form, and the influence it exercises upon the thinking process.*

I. **Origin of Language**—THREE VIEWS.—On the origin of language, three views are maintained. 1. It is considered as a gift of God to man immediately communicable, as from a master to a scholar. 2. As invented by man for the purpose of mutual intercourse, founded upon compact. 3. As a natural result of man's organization. The first view is supported on the authority of the account given in Genesis; but this is in reality inconsistent with it. Adam, we are told, named the animals brought to him,—we hear nothing of any Divine gift, and the names were probably given from the subjective impression produced on the mind by the presence of an objective reality. We see in the case of young children or of rustics to whom anything novel is presented, and especially so in savages, that an immediate desire is evinced to clothe the mental impression by some name: in fact, it is a necessity of the mind's existence, which can hardly realise the presence of any new object until it has been marked and fixed by a name which shall represent it to the mind acquainted with it, and arrest the attention of one ignorant of it. And here we may as well explain the words objective and subjective, which play so great a part in modern philosophy. The subject (to use the words of Dr. Mansel) is the mind that thinks,—the object is that which it thinks about, —a subjective impression is one which arises from the

mind itself,—an objective impression arises from observation of external things.

2. The opinion that language is the invention of man, though supported by some great authorities, appears equally objectionable if taken in any universal sense. It is true that new words are being continually introduced, and that many of these are evidently of human origin, being fashioned to represent new impressions; but the process is on a limited scale. The foundation of language, and its essential forms, are lost in the mist of antiquity. *Dr. Reid* would, however, appear to be one of those who agree with the opinion that language—at least artificial language—is the invention of man.

After stating that language may be considered of two kinds,—first, those signs which have no meaning but what is affixed to them by compact or agreement, —secondly, such as prior to all compact or agreement, have a meaning which every man understands by the principles of nature. Language, so far as it consists of artificial signs, may be called artificial ; so far as it consists of natural signs, natural. Having premised these definitions, he considers it demonstrable that if mankind had not a natural language, they could never have invented an artificial one; for all artificial languages suppose some compact or agreement to affix a certain meaning to certain signs. Therefore there must be compacts or agreements before the use of artificial signs, but there can be no compact or agreement without signs, nor without language : and therefore there must be a natural language before an artificial one could be invented. Natural language is of three kinds,—modulations of the voice, gestures, features. By means of these,· two savages who have no common artificial language, can converse together, and communicate their thoughts in some tolerable manner.

8. There remains the third opinion, that language is a natural result of man's organization, to which we do not hesitate to give our assent. The argument in favour of this view is partly physiological. There is an evident adaptation in the organization of man for speech: the faculties of the mind, the structure of the brain, and of the vocal organs, with arrangement of his being, are evidence of this. Language is a necessity of man's nature. The soul surrounded by the countless variety of things, would be lost in confusion, and unable clearly to separate its impressions, unless it could by the aid of words, mark and denote them.

II. **Original Unity or Multiplicity of Language.**—The question as to the original unity or multiplicity of language is not without its difficulties, and furnished once a subject of vehement contention, which, though barren as to the result sought for, was not without its uses. Out of the search for the primitive language, philology arose, which has rendered such important sources in tracing the affinity between language geographically very remote.

On the whole the arguments in favour of the original unity of language have the preference : the industrious researches of philologists have reduced the countless languages of the world to a few great stocks—viz., the Chinese, the Shemetic, the Indo-European, the African, the American, and the Polynesian,—and have shown the close connection between languages apparently so widely removed as Sanscrit and English; the geographical difficulties in the way of the unity of human race vanish in a great measure on an attentive examination of them.

III. **Influence of Language on Thought.**—We have to consider the influence exercised by language on the thinking process : this, according to Abp. Thomson is of four kinds. 1st. As it enables us to analyse a complex

impression. 2nd. As it preserves or records the result of the analysis for future use. 3rd. As it abbreviates thinking by enabling us to substitute a short word for a highly complex notion. 4th. As it serves as a means of communication.

In considering the analytic power of language, we have to observe that in any simple sentence—as, the bush burns, there is not only the notion of the bush burning, but a certain relation is expressed between the two notions, *i.e.*, that of present time.

Analytic and Synthetic Languages.—And here a distinction should be drawn between analytic and synthetic languages : the latter are those which express both our mental conceptions and the relation between them by one word, as " Pueri, of a boy," as τέτυφα—I have struck. The former, on the other hand, express these relations by prepositions and connectives. Sanscrit, Greek, and Latin, are synthetic languages. French, Italian, English, and generally the modern dialects of Europe, are analytic ; each kind has its advantages — the synthetic is more suitable for poetry and oratory : the analytic for serious compositions and philosophy ; in general, the more analytic a language, the better is it suited for philosophical speculations ; because the relations between Ideas can be shown with more precision by the use of prepositions than by the synthetic form. It is this quality which renders the French language unrivalled as a vehicle for subjects requiring a strict precision of language, as mathematics, logic, &c. The advantages which our own tongue possesses in its analytic form is in some degree counterbalanced by its composite origin. Our language is mainly composed of words derived from two great stocks—viz., the Teutonic and the Latin ; and hence it happens that we possess an immense number of words synonymous in meaning, but which have a very different appearance.

This circumstance is the occasion of many verbal controversies, and requires much care for its avoidance, even in systematic treatises.

It is the tendency of languages as they advance in refinement and cultivation to become more analytic, finer distinctions are seen between the relations of objects and new expressions introduced to denote them; hence, inflections are dropt, and prepositions take their place,—and so out of the synthetic and inflected Anglo-Saxon tongue, our own analytic language has arisen.

2. We have already alluded to the necessity the mind is under of recording the result of its impressions in words in order to convince itself of their reality. By this valuable contrivance the mind is enabled to perceive the result of many abstractions and generalizations, and record it in the available shape of a general term. Such words as inertia, affinity, gravitation, are summaries of so many laws of nature, and guide us by their very etymology towards the nature of the law they indicate. When it had been observed that there was a tendency in certain crystals to crystallize in the same form, and that they could be substituted one for another, the admirable word isomorphism was invented to indicate by its very form the process in question. So too the words homoeopathy and allopathy at the same describe the rival schools of medicine, and indicate the theory supported by each.—*Thomson*.

3. **Origin of General Terms** —It will often happen that when a mental conception is of a complex kind, we use a word as an abbreviated form, which either fully answers to the conception, or at least, conveys so much of it as may be necessary for comprehension ; such pregnant words as happiness, liberty, and destiny are used as abbreviations of highly complex conceptions.

4. **Division of Language.**—In considering language as a means of communication, the great superiority of

this medium over any other means of displaying the feelings, emotions, or judgments, will be at once apparent. Language has been divided by M. Duval Jouve, as under :—

$$
\text{Languages are}
\begin{cases}
\text{Natural} & .
\begin{cases}
\text{Absolute} & \begin{cases} \text{Cries.} \\ \text{Gestures.} \end{cases} \\
\text{Conventional} & \} \text{ Speech.}
\end{cases} \\
\text{Artificial} &
\begin{cases}
\text{Absolute} & \begin{cases} \text{Painting.} \\ \text{Sculpture.} \end{cases} \\
\text{Conventional} & \} \text{ Speech.}
\end{cases}
\end{cases}
$$

To this classification we should be inclined to add music as vehicle for expression, quite as much as painting and sculpture.

The superiority of language over any other medium can easily be shown. For centuries, men of undoubted genius in every country have traced on the canvass, with no small success, the memorable events recorded in Sacred History. How inadequate these, are to represent the Sacred Narrative, let he who would decide, compare the Descent of the Cross, by Rubens, with the account in the Evangelist. The picture can but seize the leading details, and would leave one at a loss as to many important particulars. The narrative gives an account of the whole scene.

An appropriate remark may be here quoted from the philosopher of Malmesbury. "Brutes," says Hobbes, "are unable to call what they want to mind, and often, though they hide food, do not know where to find it. But man has the power to set up marks or sensible objects, and thereby remember somewhat past. The most eminent of these are names or articulate sounds, by which we recall some conception of things to which we give those names as the appellation, which brings to remembrance the quality of such

objects as produce that colour or conception in us. It is by names that we are capable of science, as for instance, that of number; for beasts cannot number for want of words, and do not miss one or two of their young."

IV. **Progressive Character.** — To complete our account of language, the means by which—presuming the constitution of man's nature to be suited for its reception and propagation—it assumes its present shape, are to be considered.

1. The first principle on which words was formed was probably an imitation in sound, between the thing represented and the word representing it. There are in all languages numerous words where the sound bears a strong affinity to the sense. Only to take a few in our own,—we have such words as to howl, to squeak, to hiss, to boil, and to rattle.

2. The second step would be by abstraction and generalization; certain qualities would be observed to be invariably inherent in certain substances, as bravery in a lion, meekness in a dove, caution in the feline tribe; and when some mark or sign had been decided to denote these properties, it would be but a step to apply, in a metaphorical sense, the sign so devised to indicate the quality in man or in other animals.

3. **How Words are formed.**—But the mind would not only apprehend the presence of the realities by which it was surrounded, but would perceive their existence and relation: thence verbs would originate. All words, it has been well observed, either express *notions or existence*,—and hence Plato and Aristotle limited in effect the parts of speech to these two, from which all the rest arise.

We have lastly to observe that language is significative by mutual agreement. This is at once shown by the difference of meaning attached to the same object in different languages. There is no analogy for the

most part between the thing or conception, and the word of which it is a sign—it is purely an arbitrary sign.

In conformity with these principles Aristotle has defined a word as φωνή σημαντική κατά συνθηκιν ἄνευ χρόνου — a sound significative by compact, without relation of time.

Mankind having thus a common language by nature, though a scanty one, adapted only to the necessities of nature, there is no great ingenuity required in improving it by the aid of artificial signs, to supply the deficiencies of the natural. These artificial signs must multiply with the arts of life and the improvements of knowledge, for says Reed, it were easy to show that the fine arts of the musician, the painter, the actor, are nothing but the language of nature, which we brought into the world with us, but have unlearned by disuse, and so find thegreatest difficulty in recovering it.

CHAPTER II.

ON SIMPLE TERMS.

Analysis of Language.—The language of any book and speech generally is either expressed in the form of, or can be reduced to a series of, sentences called propositions. A proposition is an assertive sentence in which something is asserted or denied of something else. It consists of three parts,—firstly, that of which something is asserted called the Subject; secondly, what is asserted of it called the Predicate; thirdly, the expression of the agreement or disagreement of the subject and predicate called the Copula,— *i.e.*, is, or is not. The copula is the only verb recognized in logic, and in any sentence where it is not expressed, it is understood in the predicate. In the words, "a proposition is an assertive sentence," "proposition" is the subject, "assertive sentence" the predicate, and "is" the copula, expressing the agreement of one with the other. It is not necessary that the subject or predicate should consist of one word; any number of words conveying one notion are logically considered as one subject or predicate, *e.g.*, (SUBJECT) a favorable change of circumstances (PRED.) delights unfortunate persons. In this proposition it will be observed that the subject and predicate consist of several words, and that the

copula is understood in the word "delights," logically equivalent to is "delighting."

An acquaintance with propositions is the first step in logic. "The answer to every question, observes *Mr. Mill*, is contained in a proposition or assertion; whatever can be an object of belief, or even of disbelief, must, when put into words, assume the form of a proposition." A proposition consisting of a subject, a copula, and a predicate, our analysis, it is evident, cannot be carried further without an inquiry into the kind of words which can be made subjects and predicates—and hence the first part of logic is said to be concerned with *Simple Terms*, for the subject and predicate, as they always form the boundaries of a proposition, are called terms, from the latin word *termini*, boundaries.*

Simple Terms.—The mental operation by which we derive our knowledge of simple terms, is called in the language of logic, an *apprehension*. A *simple apprehension* is that of one object, as a table, "a book;" a *complex apprehension*, that of several words in a certain order or arrangement, as "the books on the table." Terms are divided into *categorematic* and *syncategorematic*. *Categorematic* words [from κατηγόρεω, to predicate] are all those which can form the subject or predicate of propositions, without needing the help of any other word; such are nouns in the nominative case, pronouns and verbs in the infinitive mood. *Syncategorematic* words, as they show by their etymology [συν=with κατηγόρεω], require the assistance of some other categorematic word, to enable them to become subjects or predicates. They include all the other parts of speech, beyond those just mentioned. In the English language, adjectives can only form predicates, as "An acquaintance with literature is

---

* On the division of Logic, *see* Note in the Appendix.

desirable;" but in the Latin, and some other tongues, both subject and predicate may be adjectives,—a noun, however, in either case being understood with which they are in agreement, as *boni sunt beati.* We have lastly to remark under this section, that other parts of speech when used as nouns, may become subjects or predicates, as "your 'If' is a wondrous peacemaker.",

Nominalists, Realists, Conceptualists.—Returning to the consideration of simple terms, and the classes into which they are divided, a preliminary question of some importance demands a passing notice. What do simple terms,—what do words represent? Are they mere names arbitrarily invented to express the operations of the mind? Are they signs of things [*signum rei*], or signs of conceptions [*signum conceptus*]. The question was one much discussed by the schoolmen, and underlies every method of philosophy. From the controversy arose the three celebrated sects of Nominalists, Realists, and Conceptualists. According to the first, they are mere names taken at pleasure—to use the words of *Hobbes*—to serve for marks which may raise in our minds thoughts, like to some thoughts we had before, and being pronounced to others, may serve to them as marks of the thoughts the speaker had in his own mind.

The same author—by far the most able advocate of Nominalism—further observes, "One universal name is imposed on many things for their similitude in some quality, or other accidents, and whereas a proper name bringeth to mind one thing only, universals recall any one of these many. A universal is not a name of many things taken collectively, but of each taken separately; man is not the name of the human species in general, but of each single man—Peter, John, and the rest separately. Therefore this universal name is not the name of *anything existing* in nature, or of any idea or phantasm *formed in the mind,* but always of some word or name.

Thus when an animal, or a stone, or a ghost, or anything else, is called universal, we are not to understand that any man, or stone, or anything else, was, or is, or can be universal; but only that these words animal, stone, and the like, are universal names, common to many things; and the conceptions corresponding to them in the mind, are the images and phantasms of single animals, or other things. The universality of one name to many things hath been the cause that men think the things are themselves universal, and so seriously contend that besides Peter, John, and all the rest of men that are, hath been, or shall be, in the world, there is yet something else that we call man,—viz., man in general, deceiving themselves by taking the universal, or general appellation for the thing it signifieth: for if any one should desire a painter to make him the picture of a man in general, he meaneth no more but that the painter should choose what man he pleaseth to draw, which needs must be some of them that are, or have been, or may be, none of which are universal; but when he would have him draw the picture of the king, or any particular person, he limiteth the painter to that one person he chooseth. It is plain, therefore, there is nothing universal but names, which are, therefore, called indefinite."

Such is the theory of Nominalism. The *Realists*, on the other hand, assert that there is answering to every common or universal name, an essence or idea coeval with, and inherent in, the object of which it is the type. The formula of the Realists was " Universalia a parte rei," and species and genera represented to them actual realities. To the Nominalist, names are merely a convenience of language; to the realist, they stand for some real existence. The *Conceptualists* adopted a medium view between the extreme advocates of either theory, but still with a leaning, more or less

pronounced, towards moderate Nominalism. They taught that names are the signs of mental conceptions, formed by the mind from the impression made on it by the* external world, and by contemplation of its own conceptions. Both the Nominalists and Conceptualists agree in repudiating the doctrine of real existence,— the substantial point in dispute; and it may be doubted whether the latter are entitled to be considered a distinct sect at all, but rather merely Nominalism in its more moderate form.

The minor point of controversy as to whether names are mere generalizations of the mind used for convenience or mental conceptions of things without, is a question of less importance, if not one purely verbal. The tendency of philosophy, since the days of Locke, has been strongly in the Nominalistic direction, and hence the majority of logical treatises form their views of words in conformity with this hypothesis.

Division of words as to their meaning, extra-Logical. —It may be doubted whether a division of words has properly any place at all in pure logic, but should fall under the cognizance of grammar; for any division of words must be made as to their meaning, which is extra-logical. The office of logic is to determine the conditions under which thought takes place in the mind, and if it treats of words, it can only do so in a secondary and accidental manner. Not to depart from the usual practice, we shall give the views entertained by writers of authority. The notions of *Aristotle* on the subject of words arise out of his theory of propositions, and as for the enunciation of a proposition, no other parts of speech are necessary but nouns and verbs,—he passes them over in silence. In his Poetics, however, he adds the article and conjunction.

The views adopted by *Harris*, in his Hermes, is in conformity with the latter modification. All words, he says, are either significant from themselves, or by

relation: if significant by themselves, they are either *substantives or attributives;* if significant by relation, *they are definitives or connectives.* And he afterwards explains that by substantives he means nouns; by attributives, verbs; by definitives, articles; and by connectives, conjunctions.

Bekker divides words into those which *express notions,* viz., nouns, adjectives, verbs, certain adverbs expressing manner or direction, and into words which merely *point out the relations between two notional words,* viz., auxiliary verbs, articles, pronouns, numerals, prepositions, conjunctions, relational adverbs.

Abp. Whately, whose views express those of the majority of logicians, divides nouns into seven classes. 1. *Singular and Common terms.* A term is *singular* when one object is considered according to its actual existence as numerically one, as London; *common,* where it is of such a description as might apply to many single objects, as city. 2. *Relative, Absolute, Correlative.* A noun is relative when it is viewed as part of a whole, viewed in reference to that whole, or to another part of a more complex object of thought, as *father, son, rider, commander;* absolute, devoting an object considered as a whole, without reference to anything of which it is a part, as *man, living being;* nouns are correlative to each other which denote objects related to each other, and viewed as to that relation, king and subject. 3. *Compatible and Incompatible.* Words which cannot be applied to the same object at the same time, are called incompatible (*repugnantia*), as white and black; words which can be so applied are called compatible [*convenientia*], as brave and prudent. 4. *Concrete and Abstract.* When the notion derived from the view taken of any object is expressed in reference to, or in conjunction with, the object that furnished the notion, it is called a concrete term, as foolish; when without any such

reference, abstract, as folly. 5. *Connotative.* When a term applied to some object is such as to imply in its signification some attribute belonging to that object, such a term is called by the earlier logical writers, connotative; but Abp. Whately prefers the term attributive. Every concrete common term is connotative, whether in the adjective or substantive form, as *man, human, triangular, saint;* for man and human, *e.g.,* are appelatives, not denoting the attribute itself which we call human nature, but a being in reference to, and by virtue of its possessing that attribute. 6. A term which denotes a certain view of a subject as being actually taken is called *positive,* as speech. A term denoting that this view might be conceivably taken of the object, but is not, is called *privative,* as speech of a deaf and dumb person. A term is called *negative* when it is not, and could not be taken, as speech of an animal. 7. Privative or negative terms are also called *indefinite* in reference to their not defining and marking out an object. In contradistinction to this, the Positive is called *definite,* because it does mark out and define.

Equivocal Analysis, Univocal Nouns, Nouns of first and second Intention.—Two other divisions of nouns are usually added, viz.—1. Into equivocal, analogous, univocal. 2. Into nouns of the first and second intention. But as Abp. Whately has rightly remarked, they are not properly divisions at all, but only in reference to our modes of using them; for the same noun, and at the same time, may be both equivocal, analogous, and of the first and second intention.

Nouns are called equivocal when they can be used in senses very different, as the word "box;" analogous when the meaning in use is derived from a more primitive one by analogy, as the word "post," which it may be remarked, is also equivocal; a univocal noun is one used *in a determinate* sense, and which can bear no other.

First and second intention.—According to Dr. Mansel (for the view of Whately and Aldrich is generally allowed to be erroneous), "a notion of the first intention is a conception under which the mind views things, whether facts of external or internal perception. A second intention is a conception under which the mind regards its first intentions as related to each other." Perhaps, however, the distinction is put in a clearer light by Hobbes, who says, that "Names of the first intention are names of things, as a man, a stone; and of the second, the names of names and speeches, as universal, particular, and other logical words."

Mr. Mill has made a fivefold division of names or simple terms. 1. *General and collective.* 2. *Concrete and abstract.* 3. *Connotative and non-connotative.* 4. *Privative and negative.* 5. *Relative and non-relative.* Mr. Mill's account of concrete and abstract, privative and negative, relative and non-relative terms do not differ essentially from those already given, so it will be sufficient for our purpose to quote what he says about the other divisions. 1. *Collective and general.*—"A general term is that which can be predicated of each individual of a multitude; a collective cannot be predicated of each separately, but of all taken together. 3. *Connotative and Non-connotative.*—Mr. Mill considers this the most important of the divisions, and the one which goes deepest into the philosophy of language; a non-connotative term is one which signifies a subject only (*i.e.*, all words which possess attributes), as John, London, virtue, or an attribute only; a *connotative* is one which signifies a subject, and implies an attribute. Connotative terms, as virtuous, white, &c., denote all things which are white or virtuous, and also imply or connote the attribute whiteness, virtue; all concrete general names are connotative, as just, good. Proper names are not connotative."

Abstraction, Generalization.—The mental process by which common names are formed, is called by logicians *abstraction and generalization,* sometimes considered as separate processes, but rather stages of the same.

Abstraction is the separation of the points of agreement in any objects presented to the mind from those of difference, that they may constitute a new name different from, and yet including the single objects; generalization is the recognition of a class of things, each of which is found to possess the abstracted marks.—*Mansel.*

CHAPTER III.

The Categories and Predicables.—When the mind by
the process of abstraction and generalization has
formed a large number of common names, some
attempt to reduce this miscellaneous and confused
assemblage to a certain order, would naturally follow.
Classification indeed seems natural to the human mind,
and to language, its instrument, and perhaps this power
is a more essentially distinguishing attribute of man
than even reason, some degree of which is possessed by
the more sagacious of the animal tribe. The mind
surrounded by the internal phenomena of its own
existence, and the external phenomena of a material
world, would be lost in confusion were it not possessed of
this attribute, which enables it to arrange its furniture
—if we may so express ourselves—in a proper order.
Language is a great instrument in this arrangement.
"We create, it has been well remarked, a class by the
use of a common name whenever there exists a number
of objects to which it is applicable."—(*Mill.*) The
categories and predicables are the result of this attempt
of the mind to reduce confusion to order : the first are
an absolute enumeration, the latter, merely a division
with reference to the class denoted.

The Categories.—The categories are ten in number: *substance, quantity, quality, relation, action, passion, locality, time, position, habit.*

Since the earliest times, a very great difference of opinion has prevailed amongst philosophers as to what these categories are intended to be an enumeration of, whether of ideas, things, or words, or of all together. According to *Ammonius, their aim is concerning words signifying things through the medium of our ideas.*

Nor has their been less diversity of opinion in modern times. *Mr. Mill* considers that they are an enumeration of all kinds of things which are capable of being made predicates, or of having anything predicated of them. They are intended as an enumeration of all things capable of being named,—an enumeration by the *summa genera, i.e.,* the most extensive classes into which things could be distributed. *Trendelenburg* views the categories as based upon principles purely grammatical, and derived from the analogy of the parts of speech. *Ritter,* in his history of philosophy, considers them as nothing more than an attempt to exhibit in a clear light the signification of words taken absolutely, to show how truth or falsehood consist in the right or wrong combination of these elements.

Sir W. Hamilton has given this account of the categories: " The categories of Aristotle are a metaphysical, and not a logical reduction. They are all divisions of *Being, Ens.* Being is divided into *ens per se* and *ens per accidens. Ens per se* corresponds to substance, the first of the categories. *Ens per accidens* comprises the other nine, for it either denotes something *absolute* or *relative;* if something absolute, it either originates in the matter of the substance, and is divisible, *quantity*—Aristotle's second category,—or in the form, and is indivisible, *quality,*—the third category. If something relative, it constitutes relation, and to *relation* the other six may be easily reduced, for the cate-

gory *locality* denotes the relation between the different objects in space, or the relation between place and the thing placed. The category *time* denotes the relation between objects in succession, or the relation between time, and a thing in time. *Position* is the relation of the parts of the body to each other, and *habit* is the relation between the thing having, and the thing had, while *action* and *passion* are the *reciprocal* relations between the agent and patient. There are on that scheme one supreme category, *ens*; two of the first descent, *ens per se* and *ens per accidens*, four of the first and second, *substance, quantity, quality, relation,* and to the dignity of category these four are pre-eminently, if not exclusively, entitled."

Objections to Categories.—The enumeration of *Aristotle* has been frequently objected to on the ground that it is redundant and defective,—redundant because the distinction between some of the categories is merely verbal, *e.g.*, between *ubi* and *situs*, and defective because it takes no notice of sensations, feelings, and states of mind, as hope, joy, fear, &c., To this charge of being defective, it may be replied that the categories only apply to the logical forms of the understanding as concerned in the determination of the agreement or disagreement of the propositions. Hence sensations, feelings, and states of mind, as hope, joy, fear, &c., cannot be considered except in the light of propositions,—the charge of redundancy we consider it difficult, if not impossible, to defend.

The categories have always played a prominent part in the history of philosophy, and various attempts have been made to improve or modify the classification of Aristotle.

Substitutions for the Categories of Aristotle.— *Mr. Mill* has proposed the following fourfold division as a substitute for that of Aristotle. 1. Feelings, or states of consciousness. 2. The minds which experience

these feelings. 3. The bodies, or external objects which excite certain feelings, together with the properties whereby they excite them. 4. The successions and co-existences, the unlikenesses and likenesses between feelings and states of consciousness. *Kant* has also proposed a fourfold division, but one which departs but little from that of Aristotle: *quantity, quality, relation and modality;* and by others they have been reduced to two, substance and attribute.

The opinions we may form of the categories of Aristotle, or of any proposed substitute, will depend upon the place we assign to them in logic or psychology. Viewed logically, the categories of Aristotle are capable of being defended against any charge but that of redundancy, whilst the substitute proposed by Mr. Mill is a psychological and not a logical enumeration.

The Predicables.—The predicables are five in number, *genus, differentia, species, property,* and *accident.* They constitute a fivefold division of general names, grounded on a distinction in the kind of class they denote. The doctrine of predicables, in its present shape, is not derived from Aristotle, but is an addition to his logic by *Porphyry,* who lived in the third century. In the form, however, we possess them, they are rather derived from the schoolmen of the middle ages, and are based upon the realistic hypothesis that names are not the generalizations of the mind used for convenience' sake, but have an independent existence in nature. The Predicables have, notwithstanding, taken so firm a hold—not only in the nomenclature of philosophy, but even in popular language--that they have been retained by logicians of the nominalistic school as a convenient classification of names.

In the discussion of this subject, it will be convenient to consider—1. The common doctrine of predicables, and the hypothesis on which it is founded. 2. The

chief objections to this theory. 3. The views of Aristotle and others.

Schoolmen's View—Realistic.—The schoolmen believing that there were answering to every common name an essence, proceeded to classify the various relations in which a name used as a predicate could stand to the subject, for predicables were not, be it remembered, a classification of names absolutely, but merely in reference to their relation to their subject for the time being. Now a predicable, in this point of view, was held either to *represent the whole essence, a part of the essence, or something joined to the essence.* The common or material part of the *essence* was called *genus,* and the formal or distinguishing part —*i.e.,* that which makes the class to be what it is, —*the difference.* The two joined together constitute the species, or whole essence. The other two predicables were not considered to belong to the essence, but to be merely adjuncts to it—one a necessary adjunct, *i.e.,* which invariably attended the essence called *Property,* the other only attending it in a contingent and accidental manner called *accident.* The five predicables were all subdivided, viz., *genus* into *summum* and *subaltern, differentia,* into *generic,* and *Specific Difference, Species* into *Subaltern* and *Infima Species, Property* into *Generic* and *Specific,* and *Accident* into *Separable* and *Inseparable.* The summum genus is the final result at which the mind arrives by continuous abstractions and generalizations. It can be predicated of all the species and genera below it, and consequently, as it comprehends them all, of every species and genus. Subaltern genera and species can be predicated, and become subjects of every coquate genus and species. Infima species is the first common nature which the mind forms a conception of from individuals : it cannot be predicated of any common term, but can be the subject of every cognate genus.

Logical and Metaphysical wholes.—We may here take notice of the terms logical whole and metaphysical whole, met with in some treatises on logic. According to *Whately*, they have reference to the extension and comprehension of genus and species. A genus is called a logical whole, and is said to contain the species, *i.e.*, to include it under its more extensive signification. The term animal contains man, whilst the latter is a more complete and full expression than animal, which is more extensive than man, as it comprehends and may be predicated of several other species, as beast, bird, &c. Hence species is called a metaphysical whole, as a more complete and full expression. "When we compare," says *Abp. Thomson*, "a vague and general conception with a narrower and more definite one, we find that the former contains more objects in it than the latter. Comparing, for instance, plant with geranium, we find that plant includes not only geranium, but the oak, pine, and lichen, and is therefore more extensive, or connotes more. On the other hand, whilst plant has more objects under it than geranium, it has fewer *marks* in it. One can describe the leaves, the petals, and the stamina of a geranium, but not of a plant. One cannot say that a plant has a stem, and therefore its intension is very limited." The greater the extension, the less the intension; or to put it in other words, the greater the connotation, the less the denotation.

There is another explanation of the terms logical and metaphysical wholes, which is perhaps more in accordance with the old writers, viz., that they do not denote "the comparison of a vague or general conception with a narrower and more general one," *but the consideration of the same term viewed as a subaltern genus or species.*

Thus, for instance, the word "plant" may be *considered as a genus* in reference to tree, vegetables,

lichens, &c., and a species as coming under the genus
"living thing." In the first case, it will be a logical
whole, and have greater connotation; in the second, a
metaphysical whole, and have greater denotation.

The division of difference into generic and specific
arose from the notion that there was some one absolute
distinguishing quality attached to each genus, which
when added to it, made up the species. If the species
be a subaltern, that is also a genus to some subordinate
species—the difference constituting it is called generic,
and is predicated of all these subordinate species. The
difference which constitutes a lowest species is called
specific, and it applies to the individuals comprehended
under the species. In the following table in column 1,
the first line contains the highest genus, the others are
subaltern genera; in column 2, the last line contains a
specific difference, the others are generic; the last line
in column 3, contains the infima species, the others
contain subaltern species.

GENUS.	DIFFERENCE.	SPECIES.
Substance	Occupying Space	Body
Body	Having Life	Living Thing
Living Thing	Animate	Animal
Animal	Suckling their Young	Mammalia
Mammalia	Having six conical Teeth in the Lower Jaw	Feræ
Feræ	Tongue prickly	Cat
Cat	Yellow and black streaked	Tiger

The division of property into generic and specific is of
the same nature as that of difference: each kind of
property of the same as the essence of which it is the
property,—hence the property of a subaltern genus is
predicated of all the species comprehended under that
genus, that of a lowest species is predicated of all
the individuals which partake of the nature of that
species. Thus "growth" is said to be the generic
property of living thing, and risibility the specific
property of man.

D

Separable and Inseparable Accident.—A separable accident is that which can be conceived either as present with or absent from the subject, as the position of sitting, standing. An inseparable accident is that which, though it has no necessary connection with the subject, yet, having been once predicated of it, henceforth clings to it, as the place of one's nativity.

But these, and other questions connected with this view of predicables will easily be ascertained by an inspection of the above table, in which substance is the highest genus, and tiger the lowest species. The other terms, as body, living thing, animal, &c., are subaltern, genera, and species. Occupying space, having life, &c., are the logical differences which distinguish each species from the collateral species belonging to the genus immediately above it. The difference added to the genus constitute the species, thus, "a substance occupying space is a body."

So much for the common doctrine of predicables, into which we have entered at some length,—not so much from any opinion of its value, as because, from the part it has played in the history of philosophy, an acquaintance with it is necessary.

II. **Objections to the Realistic view of Predicables.**— The strength of the objection to this realistic view of the predicables is mainly concentrated on the Difference and the Infima Species. To allow that there was an abstract notion to be collected from a number of individuals, or that there was some one distinguishing quality bounding off and separating the genus from all other genera, would be at once to concede to the Realists all they demand. So far from a common name having one separate and distinguishing quality, it presents a cluster of qualities which are called to the recollection of the mind by its very mention. Now it may often happen, that for any particular purpose, *it may* be necessary to fix upon one or more of those

qualities, omitting all notice of the rest. A property so used may be said, in one sense, to be the difference of the subject, but only for a special time, and particular purpose. So to the term man are attached the properties of rationality: classification, capable of veneration, a biped and vertebrate animal, cooking his food, &c., &c.; any one of which, or any combination of them, may be used for the time being to limit and specify the subject, to which it is no more peculiarly allied than the other properties.

III. **Aristotle's Theory of Predication.**—Every proposition, according to Aristotle, expresses one of four relations of the predicate to the subject. 1. *Genus,* under which may be included *Differentia.* 2. *Definition.* 3. *Property.* 4. *Accidens.* For every predicable must either be convertible with the subject or not. If convertible, it either expresses the whole connotation of the subject τὸ τί ἦν εἶναι or not. In the former case it is called a definition, in the latter, a property. If not convertible, part of connotation or not—in the former case it is a genus, in the latter, an accident.—*Mansel.*

Mr. Mill gives this account of the predicables. After stating that they are a fivefold division of general names not grounded on a difference in their meaning, but in the class they denote, he proceeds, "They express not what the predicate is in its own meaning, but the relation which it bears to the subject of which it happens at that time to be predicated. Every class which is a real Kind, that is, which is distinguished from all other classes by an indeterminate number of properties not derivable one from another, is either a genus or a species. A Kind which is not divisible into other kinds, cannot be a genus, because it has not species under it, but is itself a species, both with reference to the individuals below and the genera above, but any kind which admits of division into real Kinds, as animal *into bird* and quadruped, is a genus to all

D 2

below it,—a species to all genera in which itself is included. The difference of a species may be defined to be that part of the connotation of the specific name, whether ordinary, special, or technical, which distinguishes the species in question from all other species of the genus to which at that particular time we are referring it. A property of the species may be defined to be any attribute which belongs to all the individuals included in the species, and which, though not connoted by the specific name, yet follows from some attribute which the name either ordinarily or specially connotes. Under the remaining predicables, accident is included all the attributes of a thing which are not involved in the signification of the name, and which have not, so far as we know, any necessary connection with the attributes involved.

Predicables merely Relative Terms.—The reader must lastly remember what we have before alluded to, that the predicables are merely relative terms, and express only the relation they bear to the subject they are predicated of. Hence the same word viewed under different aspects, as " red," may be either genus, differentia, species, property, or accidens. It will be a genus in reference to the term " pink;" a species as included under the more general term "colour;" a difference as regards "red rose;" a property as regards the blood; and an accident as regards a public carriage.— *Whately*, ch. I.

CHAPTER IV.

Logical Division, different senses of the word—Division—Rules
for Division—Definition, as treated of in the older logical
treatises, is of four kinds—View of Definition according to
Aristotle, Mr. Mill, Abp. Thomson—Practical Rules for
Definitions.

Division and Definition.—According to Bœthius,
the word *Division* is used in three principal senses.
1. Division of a genus into species.   2. Division of a
whole into parts.   3. Division of an equivocal term
into its several significations. The first is logical division,
and the second should be called, according to Cicero,
partitio. Logical division is defined to be "the distinct
enumeration of many things signified by a common
name." It is analagous to, and yet differs from,
physical division.   The latter can only be applied to
individuals, whilst logical division has reference to
classes.   The name to be divided is called the divided
whole [totum divisum], and its parts the dividing
members [membra dividentia], and for the proper per-
formance of division the following rules have been
divised.
    1. The parts of the division must have a less ex-
tension than the whole term proposed for division, *e.g.*,
to divide animals into rational and irrational would be
to offend against this rule, since each of these classes
contain something not included in the word animal.
2. The dividing parts must together be equal to the
term divided. To divide man into Europeans, Africans,
and *Asiatics, would* be to violate this rule, as the

dividing parts do not equal the name to be divided, *i.e.*, no mention being made of Americans, Polynesians, &c. 3. The dividing parts must not be contained in each other, *i.e.* the division must not be a cross one. The division of words by Whately into categorematic, syncategorematic and mixed, violates this rule, since every mixed word must be either categorematic or syncategorematic. An exhaustive division may be made by the process called *Dichotomy*,—that is, the division of a *class name into two members*, as man may be divided into Cæsar and not-Cæsar. The process is useful when we do not possess sufficient knowledge of the term to be divided to enumerate all its parts, for by the method called in the schools " *Abscissio Infiniti*," that is, by repeated cutting off of that which the object to be examined is not, we may exhaust it, and so arrive finally at some practical result, not otherwise easily obtainable.

The importance of an accurate division in any subject to be treated systematically is as great as the false divisions are numerous both in scientific works and popular usage, and perhaps nothing contributes so much to the confusion of Thought as the practice of cross division everywhere to be met with.

To division immediately succeeds definition, but the order in which they should stand has been long a matter of dispute, and is so still.

As, however, every definition is necessarily in some degree a division of the name proposed for definition, the order which gives precedence to division appears to have the preference. The etymological signification of each operation may also be said to have had something to do with the arrangement. Prior to the bounding off and separating a name from all others by definition, it was considered necessary to take cognizance of the parts it contained by an exact enumeration of them, so *that not* only the common name, but its parts might be *ready for the* process of definition.

Definition.—In treating of this important · subject
we shall first give the views of definition proposed in
scholastic logic, and the objections to which it is open.
Secondly, the ·account given by Aristotle, and by
modern authorities.*

I. According to the account given in the words
of the old writers, definition is of four kinds. The
first division of definition is into *Nominal and
Real.* The latter is subdivided into Accidental and
Essential, and Essential into Physical and Metaphysical.
The ultimate division is therefore into *Nominal, Acci-
dental, Metaphysical, and Physical.*

Nominal Definition unfolds the meaning of a name
either by etymology, as animal, from anima, or by a
synonym, as "To cloak is to dissemble." Of this
kind are usually all the explanations in lexicons.
This mode of definition was greatly affected by
Aristotle and other ancient authors; and its constant
recurrence can only be explained by the circumstance
that these writers, being unacquainted with any
language but Greek, were led, perhaps half un-
consciously, into the idea of some close analogy between
the etymology of the term and the nature of the
thing. Before proceeding to consider that subdivisions
of real definition, a word must be said upon the dis-
tinction once universally drawn between *Nominal and
Real Definition :* the first was considered to explain the
meaning of the term, the latter to unfold the nature of
the thing [res]. It is, however, generally allowed by
logicians of all schools of opinion that definition has
nothing to do with any explanation of the nature of
things, except by implication, but merely with names
and conceptions. 2. The second kind of definition is
when being ignorant of the real constituents of a term,
we define it by an enumeration of such of its Proper-

---

* *See also* Note in the Appendix.

ties as occur to us, as Heat is the sensation produced by approaching the fire. 3. *Metaphysical or Logical Definition* is when we define a term by its genus and differentia, or that peculiar distinctive mark which the schoolmen believed distinguished one class from another, as "a proposition is an assertive sentence." 4. *Physical Definition* is the explanation of a term by a division of it into parts, as a proposition is a sentence consisting of a subject, predicate, and copula.

This fourfold division may without much trouble be reduced to two, Nominal and Logical; for Accidental Definition, by the agreement of nearly all our authorities, is no definition at all, but rather of the nature of a description. The difference between the two is that definition must be made by properties, and a description by accidents. Physical definition is also extra-logical, as depending upon the matter of the proposition. As logical definition must be made by the genus and differentia, it will follow that according to this view, a word to be so defined must be a species, but modern writers do not so limit definition.

II. **Definition according to Aristotle.**—Definition according to Aristotle is of two kinds, nominal and real. Nominal definition exhibits the signification of a name, or of a circumlocution such as triangular-character, equivalent to a name. Real definition is when we know that an object exists corresponding to the name. We may then inquire into the cause of this, and hence the theory of causation is at the bottom of Aristotle's view on definition. A real definition is an attempt to determine the formal cause of the definition, and is of three,—or rather two kinds (for Aristotle afterwards condemns one of these), according as the term defined is something absolute, irresolvable, and elementary, or something derived and resolvable into antecedent terms. 1. An argument demonstrating the cause of anything. 2. *An inference of* the cause which differs only in its

grammatical form, and in the arrangement of the terms from the first. 3. A conclusion from the demonstration of the cause. It is this last kind of definition which Aristotle elsewhere condemns. The definition of Attributes as well as substances is recognized by Aristotle. The answer to the question why the substance, man exists, is found in a description of what we consider the constituents of this or that man; so the formal cause, *i.e.*, that which makes a particular substance, to be called man, becomes the definition. The answer to the question, Why does it thunder? may be, "because fire is extinguished in a cloud." To the question, What is thunder?—the extinction of fire in a cloud. Why is the moon eclipsed?—because the sun's light is intercepted by the earth. The Real definition of Aristotle must not be confounded with the Real definition of the schoolmen; the latter professed to unfold the meaning of the thing, whilst the former merely assumes the existence of an object corresponding to the name. The distinction of Aristotle between nominal and real definition is pursued by Mill, and most later logicians. "There is," says *Mr. Mill,* " a real distinction between definitions of names and definitions of things; in the first, nothing is intended except to explain the meaning of the word, while in the latter, besides the meaning explaining the term, it is intended to be implied that there exists a thing corresponding to the word." This passage contains the essence of Mr. Mill's view of definition, but a fuller discussion of the same may be considered desirable.—(*Poste* and *Mansel.*)

Mr. Mill on Definition.—For this purpose it will be necessary briefly to consider what he states as to the import of propositions. After observing that there are three views on the subject—1. That it is the expression of a relation between two ideas. 2. That it consists in referring something, or excluding something,

from a class. 3. That it is the expression of a relation between two names, of none of which he approves,—he proceeds to divide propositions into essential and non-essential, or real propositions. An essential proposition is purely verbal, which asserts of a thing under a particular name, only that which is asserted of it in the fact of calling it by that name. Non-essential, or real propositions, are those which predicate of a thing some fact not involved in the signification of the term, such are all real propositions concerning things individually designated, and all general or particular propositions, in which the predicate connotes any attribute not connoted by the subject. In every proposition purely verbal (essential), either *existence, co-existence, sequence, or resemblance, is predicated or denied*. These form an exhaustive division of matters of fact, of all things that can be believed or tendered for belief, of all questions that can be propounded, and of all answers that can be tendered to them. The proper and only real definition of a term is that which defines the facts, and the whole of the facts involved in its signification. Every connotative term may be defined by a proposition which declares its meaning. Abstract and concrete names admit of definition, provided we are able to analyse, that is, to distinguish into parts the attributes, or set of attributes, which constitute the meaning both of the concrete name and the corresponding attribute; if a set of attributes, by enumerating them, if a single attribute by dissecting the fact or phenomenon, which is the foundation of the attribute. Thus he defines " rational as that which possesses the attribute of reason, and ' whiteness ' that which possesses the power or property of exciting the sensation of white."

Mr. Mill rejects what is called logical definition, *i.e.,* by genus and differentia, because in his view the *difference (if ascerta*inable) would not express the

whole connotation of the term. Accidental definition he allows in some cases, of which this is an example,— Man is an animal who "cooks his food."

ı **Abp. Thomson.**—Abp. Thomson considers there are six sources from which definition may arise. 1. From resolution when the marks of the definitum are made its definition, as, "a pension is an allowance for past services." 2. Composition the reverse of the last method in which the definitum, a conception of which the component parts are enumerated, stands subject to a definition implicitly containing those marks, as "those who abstract the property of others are dishonèst." 3. From division, when we define the object by enumerating its dividing members, as "Britons are those who dwell in England, Scotland, and Wales." 4. From colligation, the reverse of the last, where the dividing members of a concept are enumerated in the subject, and the divided conception added to define it, as "historical, philosophical, and mathematical sciences are the sum of human knowledge." 5. From change of symbol, where both subject and predicate are symbolic conceptions, the latter being given for the former on the principle of expediency only, as "Honesty is probity." 6. From casual substitution, where one representation is put for another, on the principle of expediency only, as serving to recall the marks which both possess in common, as "the science of politics is the best road to success in life."

The following are the rules laid down to secure the proper performance of definition. 1. That the definition should be equal in extent to the definitum (term proposed for definition), for if the definition were of less extent, it might only explain a part where the definitum was a whole : if greater, it might explain more than the definitum comprehended. 2. That the definition should be clearer and better known than the term defined. 3. That a proper number of words

should be employed in its enunciation, and that they be words in general use, and free from metaphors. The following definitions are therefore erroneous. 1. As offending against the first part of rule 1. "Tree, an erect plant, having foliage;" as against the second part, "Man is a civilised rational creature." 2. As against rule 2. Triangle is a figure which has any of its exterior angles equal to the interior and opposite angles. 3. As against some part of rule 3. Money is a coin. Judgment is an operation which the mind, sitting *as it were, on a tribunal,* passes sentence on the agreement or disagreement of any two objects.— (*Aldrich.*)

In attempting the definition of any term the student will find these rules useful. 1. If the term to be defined is included under some more general class, take that general notion as a starting point, and then consider what is the quality or qualities which distinguishes the term to be defined from any other notion included under the more general term. 2. Having joined these two together, observe whether your definition is fairly convertible, *i.e.,* whether the subject and predicate can change places.

To apply these rules let us suppose that the term to be defined were "University." On reflecting, it will be found that a University must be a society of some kind, and on proceeding to consider what may distinguish this particular society from others, I find the notions of "conferring degrees and encouragement of learning," and so the definition will be, "A University is a society for the encouragement of learning and the conferring degrees;" and if on converting the proposition, I find that a place for the encouragement of learning, and the conferring of degrees is a University, my definition may be assumed to be correct. In the same manner, virtue coming under the general notion *of a habit,* "and conveying the idea of tending to

promote the welfare of mankind, we may accept as the definition that virtue is a habit tending to the welfare of mankind. 3. When the term to be defined is one not readily referrible to a class we may define it by enumerating the attributes and properties which appear to belong to it, or in some cases by enumerating the accidents, as heat is the sensation caused by approaching the fire.* Single names can only be defined by enumerating their accidents.

---

* On the ambiguity of the words *Accidental* and *Accidents*, *see* Note on Definition in Appendix.

PART II.

CHAPTER I.

Propositions and Definitions, the Difference between them—
Propositions divided according to their Substance—Quantity
and Quality: as to Substance categorical or hypothetical; as
to Quality into affirmative and negative ; as to Quantity into
universal and particular—Matter of a Proposition—Sir W.
Hamilton's Theory of an absolute Quantification of the
Subject and Predicate—Dr. Thomson's modified form of the
same Theory—Opposition and Conversion—Distribution of
Terms—Advantages presented by the scheme of Sir W.
Hamilton.

ON PROPOSITIONS.

The second part of logic treats of *Propositions*,
which are the expression in words of judgments.

Words when uncombined indicate neither truth nor
falsehood. The words white elephant, inhabitant,
Ceylon, are mere arbitrary signs to indicate certain
substances and attributes, and no fact is asserted or
denied in pronouncing them; but when these words
are put in the form of a proposition, as "the white
elephant is an inhabitant of Ceylon," we make an
assertion in reference to the *habitat* of a particular
animal.

In the preceding part we have incidentally had to
consider the connexion of the subject and predicate in
a proposition, and have stated the definition of a

proposition. Now, as it will have been seen in our account of definition that every definition assumes the form of a proposition, it is necessary before proceeding further, to state the difference between the two.

Distinction between a Proposition and a Definition.— Propositions and definitions differ then in these respects. 1. Single names, *i.e.*, those having reference to one substance or attribute only, are not susceptible of logical definition. Proper names cannot be defined at all, but both can assume the form of propositions, *e.g.*, John Smith resides in Manchester, is a proposition, but not a definition, as it explains neither the name nor the nature of the proper name. 2. Every definition must be an explanation of the definitum, but a proposition need not be so : its essence consists in its being assertive or declaratory. "Est modus in rebus" is a proposition, but certainly not a definition.

Propositions—how Divided.—With these preliminary observations, we shall now go more minutely into the subject of propositions, and consider the various modifications they are susceptible of. Propositions are divided according to their *Substance, Quantity, and Quality*. The substance of a proposition is the form it assumes in language. It is called simple when one predicate is affirmed or denied of one subject, as all metals are fusible; complex when there is more than one subject, or more than one predicate, or both, *e.g.*, Cassius and Brutus perished at Philippi. Some logicians, under this head, add what are called modal propositions, *i.e.*, when the subject or predicate is qualified in time or manner, or both, as *the sun has risen to-day*, but the modality of propositions as it depends upon their matter is extra-logical. A modal proposition, when met with, should be considered as a simple proposition by attaching modality to the predicate, *i.e.*, the sun has risen to-day, is considered as *equivalent to the* sun is (having) risen to-day. The

propositions we have hitherto considered, *i.e.*, simple and complex, are also called categorical, because they affirm or deny absolutely, as opposed to *conditional or hypothetical* propositions [the words are equivalent·] A conditional proposition is one in which a condition is involved. A proposition of this kind consists apparently of two propositions, but on examination it will be found there is only one assertion, *e.g.*, if Plato is right Aristotle is wrong. In this proposition we neither assert that Plato is right, nor Aristotle wrong, but merely the condition that if one is right, the other is wrong. When a conditional proposition in place of commencing with "if," begins with "either," it is called a disjunctive conditional, as either A is B, or C is D; but this again can be resolved into two conditional propositions, as if A is not B, C is not D, and if A is B, C is D.

The second division of propositions is as to their *Quality*, into affirmative and negative; a proposition was defined to be "an assertive sentence," hence no form of words can be a proposition where something is not asserted or denied of something else. Exclamatory sentences, such as "Can envy dwell in breasts divine." *Tautœne irœ celestibus animis*, are not propositions. Some logicians also, under this head, distinguish propositions into true and false; but logic, as we have had occasion to remark more than once, is not concerned with the matter, but only with the form of language. The determination then of the truth or falsity of any proposition is clearly extra-logical, and must be left to the science from which it is taken. In determining whether a proposition is affirmative or negative, we must look solely to the circumstance whether the negative qualifies the copula or not; if it does not, an apparently negative proposition is really affirmative, as "*Non progredi est regredi*."

The next division of propositions is as regards their *Quantity, i.e.*, the extent of their subject or predicate.

B

We shall first give the view adopted by all the old logicians, and by Abp. Whately, and then consider the important addition as to the quantification of propositions due to the ability of Sir W. Hamilton.

Propositions then as regards their *Quantity* are divided by the older logicians into—1. Universal, as " *all men are mortal.*" 2. Particular, " *some men are poets*". 3. Singular, " *Socrates iz a man.*" 4. Indefinite, as " *Islands are fertile.*" This fourfold division of propositions can be reduced to two, universal and particular, for a singular proposition having its subject taken in its widest extent, is held to be equivalent to a universal, and an indefinite proposition must be either universal or particular according to the mutual relation and bearing of the subject and predicate, called the *matter of a proposition, e.g.,* in the proposition just given—Islands are fertile—the proposition is particular being plainly equivalent to " some islands," &c., whereas in the proposition " Errors are marks of human infirmities," is as clearly universal, *i.e.,* all errors are marks of human infirmities. Hence there will be four kinds of propositions viewed as to their quantity and quality, viz., universal affirmative, universal negative, particular affirmative, particular negative, which for convenience' sake are designated respectively by the letters *A, E, I, O,* so that by the mere mention of one, as " A," we know that a universal affirmative proposition is meant.

Matter of Propositions.—*The matter of a Proposition, i.e.,* the form of words under which it appears, is said to be *necessary, impossible, or contingent,*—necessary, when the subject and predicate necessarily agree, as " *all fowls are birds ;*" impossible, when they necessarily disagree, as " *all fowls are quadrupeds ;*" contingent, when the agreement or disagreement of the subject and predicate is accidental, not necessary, as " *all fowls are hens.*" As we have said before, the determination *of the truth or falsity* of a proposition belongs to the

subject from which it is taken, and the "matter" of a proposition is what logic cannot take cognizance of. We only give the distinction from the place it obtains in most logical treatises, and from its use in the doctrine of the opposition of Propositions.

Sir W. Hamilton—Quantification of Predicate.—Sir W. Hamilton, and the logicians who follow with more or less exactness his opinions, give a very different account of propositions. All propositions have, according to Sir W. Hamilton, an absolute quantification of the predicate, both in affirmative and negative propositions. In *negative, as well as affirmative judgments, we may speak of the whole of both terms, part of both terms, and the whole of the predicate, and part of the subject, and the whole of the subject, and part of the predicate,* so that there are four kinds of affirmative, and four kinds of negative propositions—eight, instead of four—which we may exhibit in this way :—

A. All X is some Y.
I. Some X is some Y.
E. No X is Y.
O. Some X is not Y.
U. All X is all Y.
Y. Some X is all Y.
W. Some X is not some Y.
Y. No X is some Y.

Abp. Thomson, one of the most able followers of the logical system of Sir W. Hamilton, yet excludes the propositions marked W, Y, on the ground of their practical inutility, *e.g.*, the proposition Y, *No birds are some animals,* and W, *Some birds is not some animals* have the semblance without the force of negatives. Sir W. Hamilton has defended his views with the ability which might be expected from him ; but into this controversy our limits will not allow us to enter. The scheme of Sir W. Hamilton is a *complete enumeration of the relations* which may subsist between any subject and

N 2

any predicate; as such, he would not have been justified in leaving out the two propositions objected, whatever may be their practical inoperativeness as negatives.

The nature or form of judgments, according to Abp. Thompson, consists in their having :—

Quantity—As to which, they are

Universal { When the whole subject is joined to the whole predicate.

Particular { Where part of the subject is joined to the predicate.

Quality—As to which, they are

Affirmative { Where the subject is decided to agree with the predicate.

Negative { Where the predicate is decided not to agree with the subject.

Relation—As to which, affirmative judgments are either

Attributive { Where an indefinite—*i.e.*, undistributed—predicate is assigned to the subject.

Substitutive { Where a definite—*i.e.*, a distributed —predicate is assigned to the subject, which may be substituted for it, and stand as its definition.

CHAPTER II.

ON OPPOSITION AND CONVERSION.

Returning to the view of propositions adopted by
the older logicians, our readers will remember that the
letters A, E, I, O, serve to indicate four propositions
complete, as to their quantity and quality. We have
now to treat of the opposition and conversion of propo-
sitions. *Two prepositions are said to be opposed when
having the same subject and predicate, they differ in
quantity or quality, or both.*

There are *four kinds* of opposition, viz., Contrary,
between A and E; Subaltern, between A and I, and E
and O; Subcontrary, between I and O; and Contra-
dictory, between A and O, and E and I.[*]

---

[*] Abp. Thomson makes a fifth kind of opposition, " Incon-
sistent" between A and U, U and Y, and A Y, thus:—

$$1 \begin{cases} \text{A.} & \text{All X is some Y.} \\ \text{U.} & \text{All X is all Y.} \end{cases}$$

$$2 \begin{cases} \text{U.} & \text{All X is all Y.} \\ \text{Y.} & \text{Some X is all Y.} \end{cases}$$

$$3 \begin{cases} \text{A.} & \text{All X is some Y.} \\ \text{Y.} & \text{Some X is all Y.} \end{cases}$$

The opposition between A and I, and E and O, is not properly an opposition at all. It should be called a mediate inference, *e.g.*, if it be true all poets are men, and also that no fowls are quadrupeds, the particular propositions involved in their signification must also, *à fortiori*, be true, *i.e.*, some poets are men, some fowls are not quadrupeds.

Contradictory Opposition the most perfect.—The most perfect kind of opposition is that between A and O, and E and I, called contradictory, for in this case the propositions opposed differ both in quantity and quality, which is not the case in any of the other oppositions, *e.g.*, of the proposition (A) all poets are men, the contradictory (O) is, some poets are not men; it is a universal affirmative, O a particular negative. It would appear to a casual observer that the most perfect opposition would be contrary,—*i.e.*, All philosophers are enthusiasts, No philosophers are enthusiasts,—but a little consideration will show that an opponent would not have much difficulty in controverting the last proposition by adducing instances of philosophers who were enthusiasts. The proposition, *Some Philosophers are not enthusiasts*, which is the contradictory of the first, could not be fairly impugned.

For an opposition to be complete, the terms in each proposition opposed must be used in the same sense which will include the five requisites of the school logicians, viz., that they should be *asserted of the same thing, in the same manner, in relation to the same object*, in comparison *with the same*, and *at the same time*.

The general rules for opposition will be collected from an inspection of the accompanying scheme, in which the letters N, I, C, represent Necessary, Impossible, and Contingent matter; T and F, True and False. It will be seen that contradictory propositions cannot be both true, but may be both false together, and that *subcontrary* propositions cannot be false together, nor

true unless in contingent matter, with other observa-
tions of the same kind :—

[Every A is B]	[No A is B]

n. t. **A.**———————— contrary ————————**E.** f. n.
i. f.   t. i.
c. f.   f. c.

subaltern   subaltern

contra-dictory / contradictory

n. t.   f. n.
i. f.   t. i.
c. f. **I.**———————— subcontrary ————————**O.** t. c.

[Some A is B]	[Some A is not B]
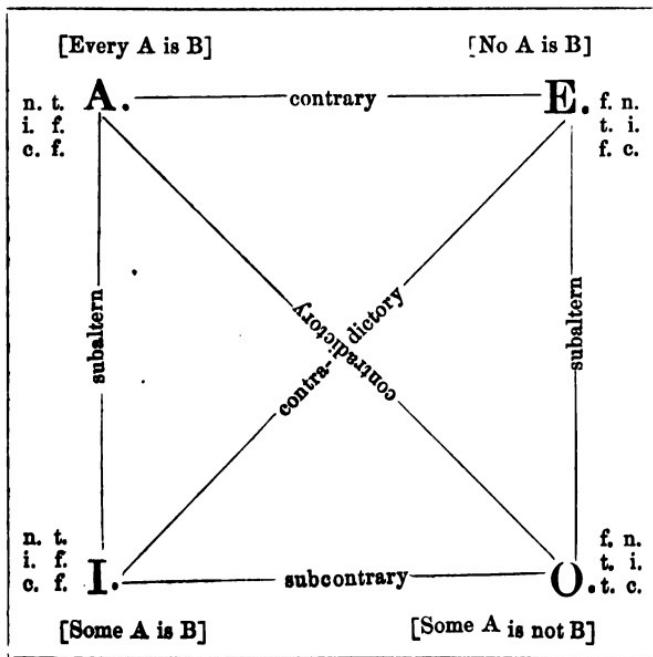
Conversion of Propositions.—A proposition is said
to be converted when the extremes are transposed, *i.e.*,
when the subject becomes the predicate, and the
predicate the subject. There are three kinds of con-
version, viz., *Simple*, by *Limitation* (per accidens), and
by *Contraposition*, and in each case a conversion to be
valid must be illative, *i.e.*, nothing must be asserted in
the converse which was not implied in the original
proposition. The validity of any conversion depends
upon the *distribution of the terms*. A term is said to

be distributed when it is taken in the widest extent of signification it is capable of.

In the universal proposition, All men are animals, it is clear that the subject is taken in its fullest extent, and that it would be false if there were any one man not an animal. The predicate, however, is not distributed, for animals mean here some animals, not all animals, for otherwise it would be true that all animals are men. Hence a universal affirmative distributes its subject, and not its predicate. In E both subject and predicate are distributed, *e.g.*, the propositions, No fowls are quadrupeds, would be false if there were any fowl a quadruped, or *vice versâ*. In the particular affirmative proposition (I) neither subject nor predicate are distributed, *e.g.*, in the proposition, Some men are poets, the word "some" attached to the subject shows that it is to be taken in a particular, not universal sense, whilst the predicate is also manifestly particular, for the proposition cannot mean that some men are all poets. In the proposition O, Some men are not learned, the subject, as is shown by the word "some," is particular. The predicate on the other hand, "learned," is distributed, or taken in its widest sense.

Conversion—Simple, per Accidens, and by Negation. —From these observations it will be apparent that E and I can be simply converted, *i.e.*, the subject and predicate can change places without alteration in the quantity or quality of the proposition; E can be simply converted because both terms are distributed, and I, because neither term is distributed. Hence in both cases, the subject and predicate are *equipollent*; A, however, as it distributes one term only, the subject, cannot be so converted, because the conversion would not be illative. It must, therefore, be converted *per accidens*, or by limitation, that is, it must first be *reduced to I*, which, of course, can be simply converted,

e.g., A,—All men are animals; I,—Some men are animals—some animals are men. There remains O, which cannot be converted by either of the above methods, owing to its predicate being distributed. It is therefore converted by negation or contraposition, that is, the negation is considered as attached to the predicate, not in the copula, and so in effect the proposition becomes I, which can be simply converted, *e.g., Some men are not poets.* Connecting not and poets together, we have, *Some men are not-poets,* which simply converted becomes, *Some not-poets are men.*

By these means, every proposition can be converted in some way, but it should be noted that A can also be converted by negation, thus, All A is B, may be put in this way, What is not B is not A. E may also be converted, per accidens, by limiting its quantity, as in the case of A. To sum up in a few words, *E I are convertible simply ; E A per accidens ;* and *A O by negation or contraposition.*

In the conversion of propositions the following rules will be found useful. 1. Observe whether the subject and predicate are in their proper place, for their position is often reversed in poetry, and sometimes in prose, *e.g.,* " He jests at wounds who never felt a scar." Here it is predicated of the person who never felt a wound, that he jests at scars, and hence the converse will be, " Some one who never felt a wound, jests at scars." 2. In general propositions, note what is the statement really asserted of the subject, and whether the subject and predicate are of equal extension. A, may be sometimes converted simply by what is called in the language of the schools, an accident of language, as a triangle is a figure contained by three straight lines —a figure contained by three straight lines is a triangle. 3. Remark whether the proposition of a negative is one really so, or only in appearance, *i.e.,* whether it affects the copula, or only the subject and

predicate. 4. If such words as "only," "almost," or other qualifying expressions, occur, see whether they are attached to the subject or predicate.

Advantages of Sir W. Hamilton's system of Notation. —One of the chief advantages of Sir W. Hamilton's scheme for the quantification of the predicate is that it does away with every kind of conversion but simple conversion. The subject and predicate having an exact quantity, can of course change places, although it must be admitted that the result is sometimes a proposition rather awkward in appearance. Thus, All men are mortal, becomes by this plan, All men are some mortal [things], which converted, becomes Some mortal [things] are all men. This awkwardness, which is a mere accident of language, does not however diminish the scientific value of the scheme, and there is no doubt but that by causing disputants in the first place, to agree as to the extension of the term, they are at variance about, it tends to prevent logomachy, or mere verbal contention.

Validity of Conversion.—The validity of the simple conversion of I and E is apparent, because nothing is asserted in the converted proposition which was not implied in the original. The validity of the conversion of A, per accidens, is thus shown. If it be true that All men are mortal, the particular proposition, Some men are mortal, must also be true, because if the universal be true, à fortiori, the particular. If some men are mortal is true, its simple converse, Some mortals are men, will also be true, and this is the conversion, per accidens, of the original proposition.

PART III.

CHAPTER I.

Reasoning of two kinds—Induction and Deduction—Induction
naturally prior to Deduction—Aristotle's Definition of the
Syllogism—Analysis of the Process pursued—Special Rules
in relation to the Syllogism—Canons of the Syllogism—
Dictum de omni et nullo—Mood—Number of Moods—Figure
—Mnemonic Lines—Specimens of Syllogisms in each Mood
and Figure—Reduction, Direct or Ostensive—Per impossibile
—Examples of Reductions.

ON REASONING.

Third Part of Logic—what it treats of.—In the
first part of logic, the kind of names suitable to stand
as subjects and predicates of propositions were con-
sidered; in the second, the proposition itself, with
its incidents; and in the third, we have to determine
how from two propositions when combined, a third may
be deduced. In every act of reasoning then must be
certain principles from which the act of reasoning
commences,—a conclusion at which it arrives,—and
such a connexion between the antecedent principles
and the conclusion, that a mind admitting the former,
must admit the latter.

Material and formal Consequence.—There are two kinds of consequence in logic. 1. Material, when the consequent is derived from the antecedent by attending to the sense of the terms. 2. Formal, when the inference is drawn from the position of the terms, and is equally apprehended whether symbols or words be used.

Induction and Deduction.—Reasoning, in the extended sense of the term, may be said to be of two kinds. 1. From Particulars to Generals, to Induction. 2. From Generals to Particulars, or Deduction. Induction is naturally prior to deduction. Before a mind can deduce a consequence there must be the general proposition, which can only be derived from a prior induction of particulars, but as deduction is usually considered first in logical treatises, and as its forms are useful in the investigation of the inductive process, we shall abide by the established order. Deduction may be defined as the process of proving one term of another by a separate comparison with a third term with which they must agree. By Aristotle it is defined as an argument "proving the major of the minor by means of a middle term."

Analysis of the Deductive Process.—The process pursued is as follows: a question arises of any kind, *e.g.,*. (for a simple illustration possesses obvious advantages) Is the horse mortal? Here are two terms, and the question is, Can one be predicated affirmatively of the other? It is evident that if some third term can be found with which both agree, the two terms will agree with each other. I observe, then, if there is any one common notion involved in the terms "horse" and "mortal,"—and on inspection, I find "animality" to be one of these,—and I then proceed to compare them separately with the third term, and the reasoning assumes this form, All animals are mortal,—The horse *is an animal,*—The horse is mortal.

The Syllogism.—This argument, when exhibited in this full form, is called a syllogism, which is defined as a " *Sentence in which from some terms laid down and conceded, a conclusion, necessarily results by, and on account of, these terms so laid down.*" A syllogism is a demonstration in which the conclusion is the problem, and the premises the proof. It consists of two parts, that which is proved, called before proof, the *Question*, and after proof, the *Conclusion*, and that by means of which it is proved, called in logical language, the *Premises.* In the above syllogism, *Is the horse mortal?* *is the question*; the two propositions, *All animals are mortal, The horse is an animal, are the premises*, from which the *conclusion* necessarily results, *The horse is mortal.*

The office of syllogism is not the discovery, but the application of truth ; its value is rather in the practical use of knowledge, than the first acquisition of it. It employs the general principles possessed by intuition or acquired by induction, and by applying them to particular and subordinate cases, brings out those intermediate principles necessary for a full knowledge of a subject. Logic is not conversant with the truth or falsity of propositions : its office is, suppose the premises to be true, what inference can be drawn from them ?

The consequence in a correct syllogism results from the mere force of the expression, without any regard to the meaning of the words, *e.g.*, if we substitute the letters A B C for the terms, animal, mortal, horse, the reasoning will be equally conclusive.

Every   A is B.
Every   C is A.
Every   C is B.

Special Rules.—There are six special rules in relation to the syllogism, which are as under :—1, Every

syllogism has three, and only three, terms, viz., the middle term, and the two extremes of the question. The subject of the conclusion is called the minor term, and the predicate of the conclusion the major, and that with which they are both compared, the middle term. 2. Every syllogism has three, and only three, propositions, the major premiss, in which the major term is compared with the middle, the minor premiss, in which the minor term is compared with the middle, and the conclusion, in which the minor and major are compared together. The expressions, *major, minor, and middle, have reference to the relative extension of the term, the major having a wider extension than the middle, and that than the minor.* In the example quoted before, it is evident that the major term, mortal, has a wider signification than either animal or horse, for both these are mortal, and of the two remaining, the middle, animal, is more extensive than the minor, horse, which is a species of that genus. We have further to observe, that the proper order in which the premises should come in a regular syllogism, is that the major premiss should be first, and the minor second; but this is by no means necessary, or even usual. Whatever may be the order of the premises, we can always find out the major premiss by *observing which one contains the major term, i.e., the predicate of the conclusion; of course, the minor Premiss will, that one of the remaining two which contains the subject of the conclusion; and the middle, that which is repeated twice in the two first prepositions.*

In England, it has been remarked by Hallam, we usually, in judicial proceedings, commence with the minor, that is, the guilt or innocence of a particular person, leaving the major, or general question, as to the relevancy of the indictment, to motions in arrest of judgment; whilst in Scotland, the contrary practice is pursued, *i.e.,* the relevancy of the indictment is first

established, before the particular question is entered upon.*

3. If the middle term be ambiguous, there are in reality two middle terms, and hence the middle term must be distributed once at least in the premises, *i.e.*, it must be the subject of a universal proposition, or the predicate of a negative proposition, and once is sufficient, since if one extreme has been compared to a part of the middle term, and another to the whole of it, they must have been both compared to the same.

Illicit Process of Major and Minor.—4. A term must not not be distributed in the conclusion which was not distributed in one of the premises, for that would be to employ the whole of a term in the conclusion, when you had only employed a part in the premiss, and so in reality introduce a fourth term. This is called an illicit process of the major or minor, *e.g.*, *illicit process of the major*, All quadrupeds are animals; a bird is not a quadruped, therefore, it is not an animal. Here, in the major premiss, the major term, animal, as the predicate of a universal affirmative proposition, is not distributed, whilst in the conclusion, as a predicate of O, a particular negative, it is not distributed. *Illicit premiss of minor:* What is related in the Talmud is unworthy of credit,—Miraculous stories are unworthy of credit. Here, if the conclusion be taken as A, the minor term, miraculous stories, will be distributed, whilst the same term, as the subject of I, in the minor premiss, is not distributed.

5. From negative premiss you can infer nothing, for as the middle term is pronounced to disagree with both extremes, these cannot be compared with each other.

---

* On the conclusions from Propositions less than general, *see* Appendix.

6. If one premiss be negative or particular, the conclusion will be negative or particular.

These rules are enumerated in the following verses :—

Distribuis Medium nec quartus terminus adsit ;
Utraque nec præmissa negans, nec particularis:
Sectetur partem Conclusio deteriorem ;
Et non distribuat nisi cum Præmissa, negetve.*

These rules depend upon what are called the two canons of syllogisms. 1. If two terms agree with one and the same third term, they agree with each other. 2. If one term agrees and another disagrees with one and the same third term, these two disagree with each other. On the former of those canons rests the validity of affirmative conclusions, and on the latter of negative.

Dictum de omni et nullo.—The syllogism itself is based upon the rule of Aristotle, commonly called the "dictum de omni et nullo," *i.e., whatever is predicated of a term distributed, whether affirmatively or negatively, may be predicated in like manner of everything contained under it.* Thus, to use our often quoted example, the term mortal being predicated of animal, distributed (*i.e.,* the subject of a universal affirmative proposition), and horse being contained under animal, mortal can be predicated of it.

Mood of a Syllogism.—The mood of a syllogism is the arrangement of the three propositions according to their quantity and quality, and designating them by their appropriate symbols. Thus, our example would be said to be in the mood *A, A, A.* The number of

---

* The meaning of the third line is that if one of the Premises be Negative or Particular, the conclusion will also be Negative or Particular, the Negative being considered as inferior [deteriorem] to the Affirmative, and the Particular to the *Universal.*

moods, by an arithmetical calculation, may be made to mount up to sixty-four, for as there are four kinds of propositions (A, E, I, O), and three propositions in each syllogism, all the possible ways of combining them will come up to that figure—$4 \times 4 = 16 \times 4 = 64$; but only 11 of these can be used in a legitimate syllogism, the others being rejected for a violation of some of the special rules lately laid down. Thus, E, E, E, must be rejected for having both premises negative; I, E, O, for an illicit process of the major, and others for similar violations of the rules.

Figure.—The figure of a syllogism is the position of the middle with reference to the major and minor terms. In the first figure, the *Middle is the subject of the Major and the predicate of the Minor Premiss.* It is the most natural figure, and the only one to which the dictum can be immediately applied. In the *second figure, the Middle is the Predicate, and in the third, the subject of both Premises.* In the fourth figure, which is the most awkward of all, and is not found in Aristotle, the middle is *the predicate of the Major, and the subject of the Minor Premiss,* as shown in the accompanying scheme, where *A* is taken as the major, *B* as middle, and *O* as minor :—

1st Fig.	2nd Fig.	3rd Fig.	4th Fig.
B, A,	A, B,	B, A,	A, B,
O, B,	C, B,	B, O,	B, O,
O, A,	O, A,	O, A,	O, A,

It is evident that the position of the middle term will affect the distribution of the terms, and hence that some of the eleven moods will not be allowable in all the figures. Thus, I, A, I, would be allowable in the third figure, but would involve an undistributed middle in the first, and on a careful comparison, it may be ascertained that each figure will admit six moods only,—in all twenty-four. Of these twenty-four moods five are *neglected,* as proving only a particular, when a *universal might* fairly be drawn.

For the remaining nineteen, logicians have devised the following names, in which the vowels represent the moods and the consonants, besides other uses, which will be explained elsewhere, serve to keep the figure in memory.

Fig. 1. { bArbAra, cElArEnt, dArII, fErIOque, prioris.

Fig. 2. { cEsAre, cAmEstrEs, fEstIno, bArOko, secundœ.

Fig. 3. { dArAptI, dIsAmIs, dAtIsI, fElAptOn, bOkArdO, fErIso, habet.

Fig. 4. { Quarta insuper addit, brAmAntIp, cAmEnEs, dImArIs, fEsApO, frEsIsOn.

Examples of Syllogisms in all the Moods.—We append, for reference, an example of a syllogism in every mood, of each figure, considering in each case, A as the major, B the middle, and C the minor term. The student will derive considerable advantage by studying the forms of syllogism as here presented, apart from the matter, but we give also at the conclusion, a specimen syllogism in each figure, drawn out at full length.

1st Figure.

b A r	Every	B	is	A,
b A r	Every	C	is	B,
A	Every	C	is	A.
c E l	No	B	is	A,
A r	Every	C	is	B,
E n t	No	C	is	A.
d A r	Every	B	is	A,
I	Some	C	is	B,
I	Some	C	is	A.
f E r	No	B	is	A,
I	Some	C	is	B,
O	Some	C is not A.

2nd Figure.

c E s	No	A	is	B,
A	Every	C	is	B,
r E	No	C	is	A.

c A m	Every	A	is	B,
E str	No	C	is	B,
E s	No	C	is	A.

f E s	No	A	is	B,
t l	Some	C	is	B,
n O	Some	C is not A.

b A r	Every	A	is	B,
O k	Some	C is not B,
O	Some	C is not A.

3rd Figure.

d A r	Every	B	is	A,
A p t	Every	B	is	C,
I	Some	C	is	A.

d I s	Some	B	is	A,
A m	Every	B	is	C,
I s	Some	C	is	A.

d A	Every	B	is	A,
t I s	Some	B	is	C,
I	Some	C	is	A.

f E l	No	B	is	A,
A p t	Every	B	is	C,
O n	Some	C is not A.

b O k	Some	B is not A,
A r	Every	B	is	C,
d O	Some	C is not A.

f E r	No	B	is	A,
I s	Some	B	is	C,
O	Some	C is not A.

r 2

4th Figure.

b r A m	Every	A	is	B,
A n	Every	B	is	C,
t I p	Some	C	is	A.
c A m	Every	A	is	B,
E n	No	B	is	C,
E s	No	C	is	A.
d I m	Some	A	is	B,
A r	Every	A	is	C,
I s	Some	C	is	A.
f E s	No	A	is	B,
A p	Every	B	is	C,
O	Some	C is not A.		
f r E s	No	A	is	B,
I s	Some	B	is	C,
O n	Some	C is not A.		

Examples of syllogisms—one in each figure :—

1st Figure.—Mood Barbara.

Every science is worthy of attention ;
Logic is a science :
Logic is worthy of attention.

2nd Figure.—Mood Camestres.

All those who reckon virtue good in itself are
true philosophers ; .
No Epicureans reckon virtue a good in itself:
No Epicureans are true philosophers.

3rd Figure.—Mood Datisi.

All animals possess power of motion;
Some animals are birds :
Some birds possess power of motion.

4th Figure.—Mood Camenes.

Whatever is expedient is conformable to nature;
Whatever is conformable to nature is not hurtful
    to society :
What is hurtful to society is not expedient.

On an examination of the table of syllogisms, several
facts will become apparent, *e.g.*, in the first figure, any
conclusion can be proved, viz., A, E, I, O. In the
second figure, only negative conclusions can be drawn,
because the middle term being the predicate in both
the major and minor premiss, one of these premises
must be negative, or the middle would not be dis-
tributed, and one premiss being negative, the conclusion
must, by rule 6, be also negative. In the third figure,
the conclusion can only be particular, because the
minor premiss being from the position of the middle
term as subject particular, the conclusion, by the same
rule will also be particular. The fourth figure, like the
first, nominally admits of any conclusion being
drawn, but being specially awkward in form, and not
found in Aristotle, it is not much used. Its intro-
duction in logic is said to be due to Galen, and its use
has been defended by Lambert, who has devised a
special dictum for this, and also for the second and third
figures.*

Uses of the Figures.—With regard to the uses of
the figures, the first will be found to be that into which
an argument will most naturally fall, except when we
wish to disprove something that has been maintained,
or is likely to be believed, when the second figure will be
found most convenient. The second figure has been called
the exclusive figure, because the arguments used in the
process called *Abscissio Infiniti*, or of excluding
certain suppositions, will in general be most easily

* *See* Appendix, NOTE C.

referred to in this figure. The third figure has been called the *Enstatic figure*, as being that used to establish an objection to an opponent's premiss, when his argument is such as to require that premiss to be universal. It will also, of course, be employed when the middle term is singular, since a singular term can only be a subject.

Reduction.—The object of this process is to bring the moods of the second, third, and fourth figures to the first, so that the *dictum de omni et nullo* may at once be applicable to them. In performing this operation we are not allowed to introduce any new term or proposition, but we may convert the premises.

Meaning of the Letters in the Moods.—To show how this reduction is to be performed is the object of the consonants in the moods of the three last figures. "S," denotes that the proposition which immediately precedes it must be simply converted; "M," that the premises must be transposed; "P," that the proposition preceding it must be converted by limitation; and "K," that the proposition before it must be left out, and the contradictory of the conclusion substituted for it. The initial consonant shows the mood to which the syllogism is to be reduced; *the other consonants have no meaning*, and are merely put in to make up the words.

Examples of direct Reduction.—We shall now proceed to give some examples of reduction, taking first the one in the mood Camestres, given before :—

All true philosophers reckon virtue a good in itself ;
No Epicureans reckon a virtue a good in itself :
No Epicureans are true philosophers.

The " m " in the word Camestres shows that the *propositions* are to be transposed, i.e., the second coming

first, and the first second. The " *s* " that the second proposition is to be converted simply, and the final " s," that the conclusion is to be simply converted. Proceeding by these directions, I take the second proposition, " No Epicureans reckon virtue a good in itself," and after simply converting it, place it first, thus, "None who reckon virtue a good in itself are Epicureans." The first proposition I place second, without further change, and then simply converting the conclusion, the whole will stand as follows, in the mood Celarent :—

> None who reckon virtue a good in itself are
>> Epicureans;
> All true philosophers reckon virtue a good in
>> itself:
> No true philosophers are Epicureans.

Our next example shall be in the mood *Darapti*, in the third figure :—

> All virtuous men are conscientious;
> All virtuous men are happy :
> Some who are happy are conscientious.

The only operation to be performed here is indicated by the letter " p," viz., the second proposition is to be converted, *per accidens*, from A to I, so as to bring the syllogism to Darii, thus :—

> All virtuous men are conscientious ;
> Some who are happy are virtuous :
> Some who are happy are conscientious.

The next example shall be from Bramantip, in the fourth figure, using henceforth merely symbols, which have the advantage of fixing the attention of the student *on the form, rather than the matter*.

BRAMANTIP TO BARBARA.—The " m " shows that the premises are to be transposed, and the " p " that the conclusion is to be converted, *per accidens,* from I to **A.**

Bramantip $\begin{cases} \text{Every} & \text{A} & \text{is} & \text{B,} \\ \text{Every} & \text{B} & \text{is} & \text{C,} \\ \text{Some} & \text{C} & \text{is} & \text{A.} \end{cases}$

Barbara $\begin{cases} \text{Every} & \text{B} & \text{is} & \text{C,} \\ \text{Every} & \text{A} & \text{is} & \text{B,} \\ \text{Every} & \text{A} & \text{is} & \text{C.} \end{cases}$

Reduction per Impossibile.—BOKARDO AND BAROKO. —We have already stated that these syllogisms must be reduced in a particular manner, that is, by what is called the indirect method of proof, often used by Euclid when the proposition does not admit of a direct proof. You take the contradictory of the conclusion, and substitute it for the premiss, to which the *K* is attached, and then draw a new conclusion, which will be found to contradict one of the original premises. Now as these are always supposed to be true, it follows that the new conclusion must be false, and therefore its contradictory will be true, but this is the original conclusion, which is therefore held to be true.

Baroko $\begin{cases} \text{Every} & \text{A} & \text{is} & \text{B,} \\ \text{Some} & \text{C is not B,} \\ \text{Some} & \text{C is not A.} \end{cases}$

The contradictory of some C is not A is Every C is A, which I substitute for the second Proposition, leaving the first as it is:—

Every A is B,
Every C is A,
Every C is B,

This conclusion contradicts the minor, Some C is not B, and therefore must be false. Bokardo is converted in a similar manner, only that in this case we substitute the contradictory of the conclusion for the major premiss, thus :—

Bokardo
$\begin{cases} \text{Some} & \text{B is not A,} \\ \text{Every} & \text{B is C,} \\ \text{Some} & \text{C is not A.} \end{cases}$

CONVERTED BECOMES—

Every C is A,
Every B is C,
Every B is A.

The conclusion of which, Every B is A, contradicts the major premiss of the original syllogism, Some B is not A, and must therefore be false.

Direct' conversion of Baroko and Bokardo.—These two moods may however be converted directly by the system of conversion by negation, thus, in Baroko by converting the major by negation, and considering the minor as I, we bring to Ferio, e.g. :—

What is not B is not A,
Some   C is not B,
Some   C is not A.

In like manner, Bokardo may be reduced to Darii by converting the major by negation, and then transposing the premises; the conclusion will be the converse by negation of the original one.

Every   B is C,
Some   not-A is B,
Some   not-A is C.

Every direct conversion must be illative, that is, the conclusion of the converted syllogism must either be the same as the original one, or one which follows from it. In indirect conversion [per impossibile] we do not prove the truth of the original proposition, but merely that an absurdity would result from the assumption of its being false.

CHAPTER II.

ON CONDITIONAL OR COMPOUND SYLLOGISMS.

Hypothetical Syllogisms of Aristotle.—There is considerable difference of opinion as to whether these syllogisms are found in Aristotle or not, but, according to Mansel, the syllogisms [ἐξ ὑποθεσεως] differ considerably from what is now understood by the term hypothetical or conditional syllogisms.

The hypothesis in the syllogisms of Aristotle is, so to say, outside the syllogism : two disputants agree that X shall be Y if C is A, and then the reasoning proceeds in this way :—

$$\text{Every} \quad \text{B} \quad \text{is} \quad \text{A,}$$
$$\text{Every} \quad \text{C} \quad \text{is} \quad \text{B,}$$
$$\text{Every} \quad \text{C} \quad \text{is} \quad \text{A.}$$

And this conclusion being established, it follows from the *previous* agreement, that X is Y.

Conditional Propositions.—A conditional proposition is defined to be two or more categoricals united by a copula (conjunction), and are named from their respective conjunctions, hypothetical, disjunctive, causal. A proposition may be conditional in appearance only, and in reality, categorical, *i.e.*, when the reasoning does not turn upon the hypotheses, *e.g.* :—

> Every despot is either tyrannical or cruel :
> Napoleon was a despot.
> He was either tyrannical or cruel.

But when the reasoning rests on the hypothesis, it is really a conditional syllogism.

Hypotheticals.—An hypothetical proposition consists of two or more categoricals, whereof that from which the other results is called the antecedent, and that which results from it the consequent, and the connexion between the two is expressed by the word " if," called the consequence. It is on this consequence that the truth or falsity of the proposition depends, for both the antecedent and consequent may be false, and the whole be true, or *vice versâ* ; both may be true, and the whole false, *e.g.*, If logic is useless, it deserves to be neglected, where the whole proposition is true, though neither the antecedent, that "logic is useless," nor that " it deserves to be neglected," are so.

On the other hand, the proposition, " If Napoleon was a Corsican, he was a usurper," is false, *i.e.*, it does not follow from his being a Corsican, that he was a usurper, though the antecedent and consequent are both true,—and note that the proper order is for the antecedent to come first, and the consequent last, but this is not always the case.

Rules for Hypotheticals.—The leading principle in *reference to* hypothetical propositions, the antecedent *being granted*, the consequent is granted, may be con-

sidered in two ways. 1. If the antecedent be true, the consequent *must be true; hence the first rule, the antecedent being granted, the consequent may be inferred.* 2. If the antecedent were true, the consequent would be true, and hence the second rule, *the consequent being denied, the antecedent may be denied,* for the antecedent in that case must be false, since if it were true, the consequent which is granted to be false, would be true also, *e.g.,* If this man has a fever, he is not fit to travel. Here, if you grant the antecedent, the first rule applies, and you infer the truth of the consequent—he has a fever; therefore he is not fit to travel. If A is B, C is B, but A is B, therefore C is D. This is called a *constructive hypothetical syllogism.*

Destructive Hypotheticals. — But if you deny the consequent, *i.e.,* grant its contradictory, the second rule applies, and you infer the contradictory of the antecedent—he is fit to travel; therefore he has not a fever, and this is called the *destructive hypothetical syllogism.* If A is B, C is D, C is not D, therefore A is not D. But if you *affirm the consequent, or deny the antecedent, you can infer nothing, for the same consequent may follow from other antecedents:* a man may be unfit to travel from other disorders besides a fever; therefore, it does not follow from his being unfit to travel that he has a fever, or from his not having a fever that he is fit to travel. There are, then, two kinds of hypothetical syllogisms, the constructive, answering to direct reasoning, and the destructive, answering to indirect.

They may all be converted by negation, by taking the contradictory of the consequent as an antecedent, and the contradictory of the antecedent as a consequent.

Disjunctives.—When a proposition begins with "either," followed by "or," and states an alternative,

it is called a disjunctive, and it is implied that one of the categoricals so united must be true, *e.g.*, either C is A, or B is D, implies that one of these must be true. If, therefore, one or more of these categoricals be denied, you may infer that the remaining one, or if several, some one of the remaining ones, is true. It is either Spring, Summer, Autumn, or Winter. It is not Autumn or Winter, therefore it is either Spring or Summer.

The Dilemma.—The Dilemma is a conditional syllogism with several antecedents in the major, and a disjunctive minor. There are two kinds of the dilemma,—the constructive and destructive, and of the first there are two kinds,—the simple constructive, and the complex constructive. In the first case if you have in the major premiss several antecedents with all the same consequent, then these antecedents being (in the minor) disjunctively granted, the one common consequent may be inferred : *e.g.*, if A is B, C is D, and if X is Y, C is D, but either A is B, or X is Y, therefore C is D.

The complex constructive Dilemma is when the several antecedents, have each a separate consequent, then the antecedents being disjunctively granted, you can only disjunctively infer the consequents. If A is D, C is D, and if X is Y, E is F ; but either A is B, or X is Y, therefore, either C is D, or E is F.

The Destructive Dilemma.—This is when having several antecedents, with each a different consequent, instead of wholly denying these consequents, you disjunctively deny them, and hence in the conclusion, disjunctively deny the antecedents. If A is B, C is D, and if X is Y, E is F, but either C is not D, or E is not F, therefore either A is not B, or X is not Y.

Every dilemma may be reduced into two or more *simple* hypothetical syllogisms, as—1. If A is B, C is

D, A is B, therefore C is D. 2. If X is Y, E is F, X is Y, therefore E is F.

Reduction of Conditionals.—Every conditional proposition, including the dilemma, may be considered as one categorical, the antecedent answering to the subject, and the consequent to the predicate, *e.g.*, to say, If Napoleon is a good Emperor, France is like to prosper, is equivalent to the statement:—the case of Napoleon being a good Emperor, is a case of France being likely to prosper; and if you grant the minor premiss, that Napoleon is a good Emperor, you infer (in Barbara) that the present is a case of France being likely to prosper, which exactly answers to the original conclusion of the conditional syllogism.

As the constructive conditional may be reduced to Barbara, so the destructive may be reduced to Celarent, or all conditionals may be reduced to Barbara by converting by negation the major premiss. It is not, however, intended that conditionals should be reduced to categoricals as a rule, but the object of the preceding observation is to prove that we can subject any argument whatever to the test of Aristotle's dictum, in order to show that all reasoning turns upon one simple principle.

A dilemma may, of course, be reduced to two or more categorical syllogisms.—[*Whately*].

Enthymeme.—The usual definition of an enthymeme as a syllogism with one premiss suppressed, is now generally abandoned as erroneous, and founded, as Mansel shows, on a mistaken construction of the definition of Aristotle, "an imperfect syllogism from signs and probabilities." The word rendered imperfect, "ἀτελης," is now generally considered spurious, and a further argument grounded upon the supposed derivation of the word from ἐν, in, and θυμος, mind, meaning that one premiss is retained in the mind, proves, on examination, to be equally worthless, for the word

ενθυμημα was not a new word coined to describe this particular argument, but already existed in the language in a popular sense, before a logical definition was assigned to it. The true definition then of an enthymeme, as a " syllogism from signs and probabilities," shows that the way in which it differs from the true syllogism is not in the form, but in the matter, and it is somewhat strange that Whately, who considers that the syllogism is not only a type of reasoning, but the only method in which men can reason, should sanction a statement which by implication, runs directly counter to his argument. The difference then between an enthymeme and a syllogism resting in the matter, we have to inquire what is the matter of which the former is composed. The validity of a correct syllogism is shown, as we have before stated, from the mere form, and the argument is equally conclusive whether words or letters be used. This is not the case with the enthymeme, whose logical force depends solely on the words. The εικος, or probability in an enthymeme, is a proposition stating a probability, and the argument assumes a form approximating to that of the syllogism, but generally logically invalid, as violating some special rule, e.g. :—

> Most usurpers are tyrants (Probability) ;
> This man is a usurper:
Therefore—He is [probably] a tyrant.

The σημειον, or sign, is a proposition stating a single fact, and founding a conclusion upon it, e.g. :—

> Persons who have a fever are unfit to travel ;
> This man has a fever :
Therefore—He is unfit to travel.

The enthymeme, it will be seen, is of low logical value, and approximates rather to rhetoric than logic.

Sorites.—The sorites is a string of syllogisms in the first figure, in which the conclusion of each is made the premiss of the next, till you arrive at the main or ultimate conclusion. The predicate of the first proposition is made the subject of the next, and so until finally the predicate of the last premiss is predicated in the conclusion of the subject of the first:—

> The English are a brave people;
> A brave people are free;
> A free people are happy:
Therefore—The English are happy.

A sorites has as many middle terms as there are intermediate propositions between the first and the last, and it may be drawn out into as many separate syllogisms of which the first will have for its major premiss the second, and for its minor the first of the propositions of the sorites. It may be noted that in the sorites, only one minor premiss, the first, is expressed. The sorites being strictly syllogistic, must be tested by the ordinary rules belonging to the first figure; the first proposition only may be particular, because in that figure the minor may be particular, and not the major. There can be only one negative premiss, the last, because if any other were so, a minor premiss must also be negative, and that is contrary to the rules of the first figure.

Example.—Example bears the same relation to induction as the enthymeme does to deduction. It is defined by Aristotle as proving the major of the middle by a term resembling the minor, and by Abp. Thomson as an argument which proves something to be true in a particular case, from another particular, *e g.* :—

> Cæsar was a despot;
> Cæsar was a conqueror:
Therefore—All conquerors are despots.

Napoleon is a conqueror:
Therefore he will be a despot.

The example differs from induction in that whilst the latter stops short at the general principle, the former proceeds to infer a particular instance from it. It is of a low logical value, and bears some relation to the argument from analogy in the popular sense of the term. Analogy, however, as used by Aristotle, signifies a proportion of ratios, viz., as 4 is to 8, so is 16 to 32; as the eye is to the body, so is the ruler to the state.

Reasoning from Analogy corresponds, according to Mansel, to what is sometimes called the Induction of Socrates.

Like Example, it has no logical value as an independent reasoning, its symbolical formula being A is to B, as C is to D. A is X, therefore, C is X. Here it is evident that the premises may be true, and yet the conclusion false. Its material value, like that of Example, may admit of any degree from zero to moral certainty.—*Appendix to Aldrich*, page 229.

CHAPTER III.

ON FALLACIES.

Fallacies.—A fallacy has been defined by Whately as an unsound mode of argument, which appears to demand our conviction, when in fairness it ought not; and as most of the ordinary divisions of fallacies are based on the classifications of Aristotle, a consideration of his views shall have the first place.

Aristotle's Classification.—There are, according to this author, thirteen distinct kinds of fallacies, arranged under the two capital divisions. I. False ratiocination depending upon language, which includes six kinds; and—II. False ratiocination independent of language, comprising the other seven. 1. Of the first kind are—*a*, those resulting from the ambiguity of a term; *b*, from the ambiguity of a proposition; *c*, from the possibility of a wrong conjunction; *d*, from the possibility of a wrong disjunction; *e*, wrong accentuation; *f*, similarity of termination. 2. *a*, those arising from the equation of subject and predicate; *b*, from the confusion of an absolute statement with one limited in manner, time, place, or relation; *c*, from an inadequate notion of imputation; *d*, from a conversion of consequent and antecedent; *e*, from begging the question;

f, from taking what is not a cause for a cause; *g*, from putting many questions.*

Whately's Classification.—The views of this author, which are set forth with much clearness and power of illustration, are a kind of commentary on the above passage from Aristotle. Like that author, his first leading division is into In Dictione, or in the words, and Extra Dictionem, or the matter.

Fallacies of the first kind, as subdivided into purely logical and semi-logical fallacies, and those of the latter description will be found to range themselves under the heads, Undue Assumption of a Premiss, and Ignoratio Elenchi, which may be exhibited thus:—

<div align="center">Fallacies.</div>

In Dictione.		Extra Dictionem.	
Purely Logical	Semi-Logical	Undue Assumption of Premiss.	Ignoratio Elenchi.

Observing then this fourfold division, we shall proceed to examine each kind separately.

I. **Logical Fallacies.**—These are of a kind the fallaciousness of which may be detected from the mere form of expression, without any regard to the sense. They generally consist in the violation of one of the plain rules of logic set forth in the preceding pages, such as—1. Undistributed Middle. 2. Illicit Process. 3. Negative Premises, or Affirmative Conclusion from a Negative Premiss, or *vice versâ*. 4. Those which have more than three terms expressed.

II. **Semi-Logical Fallacies.**—The second class of fallacies are those in which some attention to the matter is necessary, so that here logic teaches us not how to find the fallacy, but only where to search for

---

* Poste's translation of De Soph. Elen., collated with original, *page 8.*

it, and on what principle to condemn it. The fallacy generally arises from the middle term being ambiguous, designedly so caused, or by an accident of language, and assumes various forms, of which the most important are—1. *Fallacia figuræ dictionis*, the fallacy resulting from the belief that words belonging to the same root have a precisely corresponding meaning, *e.g.* :—

> Projectors are unfit to be trusted;
> This man has formed a project :
> Therefore—He is not fit to be trusted,—

Where it is assumed that he who forms a project must be a projector : whereas, the bad sense attached to the first word, does not apply to the second. 2. *Fallacia plurium interrogationum*, or the fallacy of interrogation, *i.e.*, of asking several questions which appear to be but one, so that any answer given properly only applicable to one, *may be applied to ull.*

> " Was not Aristotle the opponent of Plato, fond of arbitrary statements, conceited of his own authority, and the founder of the sect of the Peripatetics ? "

3. Fallacy of Division and Composition, where the middle term is used in one premiss collectively, and in the other distributively, as :—

> Five is one number;
> Three and two are five :
> Therefore—Three and two are one number.

4. Fallacia accidentis, where the middle term is used in one premiss to signify something considered simply, and in the other to imply that its accidents are taken into account, *e.g.* :—

> What is bought in the market is eaten;
> Raw meat is bought in the market.
> Therefore—Raw meat is eaten.

Here the middle term in the major premiss is under-stood, " *as to its substance merely* ;" in the minor as to its conditions and circumstances.

III. **Petitio Principii.**—Of the material fallacies, the first place is due to what is called petitio principii, *i.e.*, where the premiss appears manifestly the same as the conclusion, or is actually proved from the conclusion.

Under this is included the not uncommon one of arguing in a circle, where each premiss is implied, or contained in the other, so that your apparent progress only leads you to the point you started from, as when you prove the necessity of regeneration from the depravity of man, and then prove the depravity of man from the necessity of regeneration, or when arguing on the obligation of virtue, you assert that virtue is obligatory because it is reasonable, and it is reasonable because it is " fitting," and it is fitting because it tends to the advantage of man, and it tends to the advantage of man because it is reasonable.

The fallacies of *non causa pro causâ et non vera pro verá*, met with in the older logical treatises, are nothing but the assumption, in various forms, of a premiss. Sometimes from the existence of a pre-tended cause, a pretended effect is inferred, or *vice versâ*, the pretended effect may be employed to establish the cause, as the opponents of the Reformation assumed it was the cause of the troubles of the period, and hence an evil.

IV. **Ignoratio Elenchi.**—The last leading division of fallacies is that of the Ignoratio Elenchi, which assumes many forms in language. The fallacy consists in not proving the proposition requiring proof, or demonstrating the contradictory of your opponent's thesis, but of establishing some proposition resembling it. For instance, instead of proving that a prisoner has committed an atrocious crime, you prove that the *fraud he is accused* of is atrocious, or instead of proving

that the poor ought to be relieved in this way or that,
"you prove that the poor ought to be relieved."
Under this head may be referred all arguments not
ad rem whenever they are unfairly employed, such as
the argumentum ad hominem, or personal argument;
the argument *ad misericordiam ad verecundiam*, &c., &c.
and the very common *fallacy of objections, i e.*, when
it is inferred that a measure should be rejected because
there are objections to it, forgetting that the question is
not whether there may not be objections to the pro-
posed course (for this is certain), but whether the
objections outweigh the advantages.

Fallacies most commonly met with.—These are
undoubtedly the petitio principii and the ignoratio
elenchi, for in popular assemblies the question to be
proved is often silently *assumed as proved*, and in law
courts the attention of a jury is distracted from the
question of the guilt or innocence of the prisoner, by
dissertations on the hardships of a particular statute.

Objections to Whately's Division.—Poste has objected
to Whately's classification of all fallacies for the
detection of which a knowledge of words is necessary,
into extra-logical, as untenable, because some knowledge
of words must be possessed even by the logician; he
must know the terms of his art as Universal, Particular,
Major, Minor, Middle, &c., or he could not perform the
most elementary operation in logic.

Mill's Classification.—The view given by Mill is
somewhat different, and in conformity with his view of
logic, includes inductive as well as deductive fallacies.
The supposed connexion or repugnance he observes be-
tween two facts may either be a conclusion from evidence,
that is (from some other proposition or propositions),
or may be admitted without any such grounds,
admitted as the phrase is, on its own evidence, em-
braced as self-evident as an axiomatic truth. This

gives rise to the first great distinction, that between *fallacies of inference and fallacies of simple inspection.*

Fallacies of inference, or erroneous conclusions from supposed evidence, must be subdivided according to the nature of the apparent evidence from which the conclusion is drawn. The evidence may be either distinctly conceived or indistinctly, *i.e.*, we may know exactly what our evidence is, and yet draw a false conclusion, or we may substitute, as we proceed, different premises in the place of those with which we set out, or a different conclusion for that which we undertook to prove. When the fallacy is not one of confusion, there remains to be made *two cross divisions, giving rise to four classes.* The apparent evidence may be either particular facts, or foregone generalizations, that is, the process may either simulate induction or deduction, and again, the evidence may be false in itself, or being false, may fail to bear out the conclusion supposed to be founded upon it. This gives us first, Fallacies of Induction and Deduction, and then a subdivision of each, according as the suppressed evidence is false or true, but inconclusive. Fallacies of Induction, where the facts on which the induction proceeds are erroneous, may be termed Fallacies of Observation, and when the facts are correct, but the conclusion is not warranted from them, Fallacies of Generalization. Deductive Fallacies constitute a class in which the premises of the ratiocination do not bear out its conclusion, —the various cases in short of vicious argumentation provided against by the rules of the syllogism. These may be called Fallacies of Ratiocination. The following synoptic table expresses the five distinguishable classes of fallacy, the ultimate division being into *Fallacies à priori, Fallacies of Observation, Fallacies of Generalization, Fallacies of Ratiocination, and Fallacies of Confusion.*

Fallacies.

- Of Simple Inspection.
  - 1. Fallacy à priori.
- Of Inference.
  - From evidence distinctly conceived.
    - Inductive Fallacies.
      - 2. Fallacies of Observation.
      - 3. Fallacies of Generalization.
    - Deductive Fallacies.
      - 4. Fallacies of Ratiocination.
  - From evidence indistinctly conceived.
    - 5. Fallacies of Confusion.
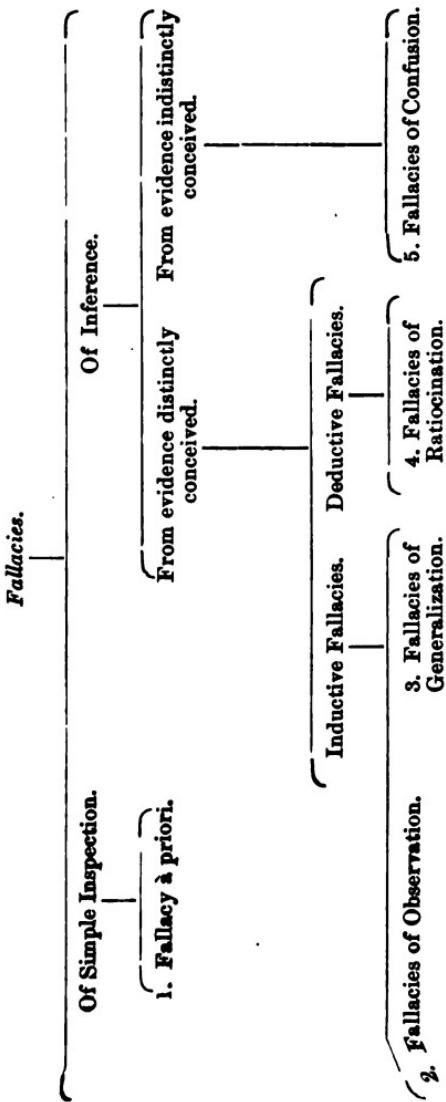
Bacon's Division of Fallacies.—The celebrated Idols of Bacon are intended to be an exhaustive division of the fallacies which result not so much from the accidents of language as from deep-rooted errors of the mind. The term Idols, as used by Bacon, means false appearances, and these false appearances, which tend to deceive mankind, are four in number. 1. Idols of the Tribe, or those resulting from the ordinary imperfections of human nature. 2. Idols of the Den, or those resulting from particular prejudices of the mind. 3. Idols of the Forum, which arise from the wrong use of words, and—4. Idols of the Theatre, or those from erroneous systems of philosophy. This division, as it depends on the matter, is extralogical.

CHAPTER IV.

Is the Syllogism a Petitio Principii ?—Importance of the
   question—Three leading Views on the Subject—1. Opinions
   of Campbell, Dugald Stewart—2. Of Whately, Mansel—
   3. Of Mill—Observations on the General Question.

The question whether the syllogism involves a
petitio principii (*i.e.*, whether in the argument, All
men are mortal ; Lord Derby is a man : Lord Derby is
mortal,—the conclusion, Lord Derby is mortal, is, or is
not, contained in the major premiss, All men are
mortal) is one that has been much debated in these
days, and as it would appear, to cut at the root of logic,
might seem to have demanded an earlier discussion in
these pages. In the first place, however, it was
thought that the somewhat abstract question involved
in its discussion, would be better understood after the
student had made some progress in the science ; and
then it is believed that the importance of the subject
has been overrated, and that the claims of logic to be
attentively studied would not be effected, even if the
question were answered in the affirmative.

There are three leading views held on the question,
which we shall first discuss, and then adduce some
arguments in support of the opinion just alluded to.

1. A numerous class of reasoners, of whom Dr.
Campbell, Dugald Stewart, and perhaps Locke, may
be cited as examples, maintain the absolute worthless-
ness of the syllogistic process on the ground of its
involving the evident petitio principii, before alluded
to. Their objections to the syllogism arose from the

mistaken notion that it was intended by Aristotle to be used in the discovery of new truths, and not merely as an instrument in the application of them to particular and subordinate instances.

2. A second class of writers, represented by Whately and Mansel, absolutely deny that there is any petitio principii at all in the syllogistic process.

We may dismiss shortly the ingenious, rather than forcible "tu quoque," argument of the first writer, that as the syllogistic process is the type of reasoning, the only method men must or can adopt in argument, it would follow that if the syllogism be a petitio principii, the objection to its validity is also one. The question, after all, is too important to be met by a side thrust, nor is the blow to be parried by an invasion of the enemy's territories. The assertion of Dr. Campbell is sufficiently clear, and the defence, if attempted at all, must rest on clear and intelligible arguments. The first argument of Dr. Mansel is that the charge of the syllogism being a petitio principii, can only be main-tained at any rate as regards syllogisms of controversy, because the Greek equivalent, τὸ ἐξ ἀρχῆς αἰτεῖσθαι, implies that some question is in dispute, which is not the case in the pure syllogism of inference, the con-clusion of which results from a prior conclusion.

Mansel also maintains that the universal proposition "All men are mortal," is not merely a concise way of stating that Socrates and Plato possess that attribute in common with all other men, past, present, and future, but that by virtue of a certain established law, certain attributes, or groups of attributes, are always so united that in whatever individuals we find the one, we may look upon them as an infallible mark of the other.

Unless, therefore, the establishment of an universal *proposition* requires an explicit and conscious exami-*nation of every* existing, and also of every possible

particular instance, no charge of petitio principii, or even of vain repetition, can be maintained against the syllogism. Those who affirm it is so, abandon themselves to an absolute scepticism, and against such no defence of human knowledge can be attempted.

3. A third class of logicians, of whom Mr. Mill may be taken as the representative, admit that the syllogism involves a petitio principii, but defend its utility on other grounds. Every syllogism, says Mr. Mill, considered as an argument to prove a conclusion, contains a petitio principii. It cannot be denied that the conclusion, "Lord Derby is mortal," is contained in the premiss, "All men are mortal." Mill considers, however, that the conclusion, "Lord Derby is mortal," is not derived from the general proposition, "All men are mortal," which is itself a generalization of individual cases. A general proposition is merely a compendious form for recording and preserving in the memory a number of particular facts, all of which have been observed. From instances which we have observed, we feel warranted in concluding that what we have found true in these instances, holds good in all similar ones, past, present, and future. We then, by that valuable contrivance of language which enables us to speak of many as if they were one, record all we have observed, together with all that we infer from our observations in one concise expression, and thus have only one, instead of an endless number, to remember, or to communicate. The result of many observations and inferences, and instructions for making innumerable inferences in unforeseen cases, are compressed into one short sentence. When, therefore, we contend that from the death of Socrates, Wellington, John, Thomas, and every person we have ever heard of, that Lord Derby is mortal, we may indeed pass through the generalization, "All men are mortal," but it is not in the latter half of the process, the descent of Lord Derby from all

men, that the inference resides. The inference is finished when we have asserted that " All men are mortal." What remains afterwards to be performed is merely deciphering our own notes. From these considerations the following conclusions seem to be established : All inference is from particulars to particulars; general propositions are merely registers of such inferences already made, and short formulæ for making more. The major premiss of a syllogism is therefore a formula of this description, and the conclusion is not an inference drawn from the formula, but according to the formula, the real logical antecedents or premises being the particular facts from which the general proposition was collected by induction. These facts and individual instances may have been forgotten, but a record remains, not indeed descriptive of the facts themselves, but showing how these cases may be distinguished, respecting which the facts when known were considered to warrant a given conclusion. According to the indications of the record, we draw our conclusion, which is to all intents and purposes a conclusion from the forgotten facts; for thus it is essential that we should read the record correctly, and the rules of syllogism are a set of precautions to ensure our so doing.

The value of the syllogistic form, and of the rules for using it correctly, does not consist in their being the form according to which our reasonings are necessarily, or even usually made, but in furnishing us with a mode in which these reasonings may always be represented, and which is admirably calculated, if they are inconclusive, to bring this inconclusiveness to light. Its further uses are that the induction may be made once for all; a single careful interrogation of experience may suffice, and the result may be registered in the form of a general proposition which is committed *to memory or* writing, and from which we have only

afterwards to syllogise. The particulars of our experience may be dismissed, and the result retained in a commodious, and immediately available shape.

In considering these various views, we think it cannot be denied by any impartial observer that the syllogism *does* contain a petitio principii, but as we said before, the importance of the question involved has been exaggerated, and the utility, nay indispensability, of the syllogistic process may be safely defended.

All truths are either truths of involution or evolution, of induction or deduction; either we assemble together a number of individual facts, and mould them into the form of a general proposition, or we unfold the full implication of the general proposition, and apply it to particular instances. To say then that the conclusion, Lord Derby is mortal, is implied in " All men are mortal," is undoubtedly true, but it is only what may be asserted of every deductive science. In Euclid, for instance, every proposition depends upon the foregoing, and not only this, but the whole science of geometry ultimately depends upon certain simple axioms and definitions, from which the remotest conclusions are ultimately derivable. In Arithmetic, each new rule presupposes the knowledge of the preceding one, and rests upon it. Now we know as a fact, that some persons of genius, as the great Pascal, have managed to construct a Euclid for themselves, starting from the elementary propositions, and instances of the same kind are occasionally observed in either branches of mathematics. What then?—because some great abilities can dispense with the intervening steps, are we to discard them and to suppose that every one can dispense with them ? The attempt would be absurd. It is just the same in the syllogism; the conclusion, " Lord Derby is mortal," may be, and is, truly implied in the general proposition, " All men are mortal," but

it is not the less a new and distinct proposition. It is not every one that might draw the inference immediately, and moreover the new proposition may be required as the step to a fresh conclusion.

Whenever the world arrives at that pitch of knowledge and enlightenment when the full implication of general propositions is immediately observable, when we can trace a long line of reasoning without need of the intervening links, then indeed, *and not till then*, the syllogism may be dispensed with. Waiting that happy period, we may promise the syllogism an existence as long as reasoning and language, of which it is the type and instrument.

CHAPTER V.

INDUCTION.

Induction prior to Deduction.—Induction is prior to and yet the complement of Deduction, for every conclusion derived from the latter source must ultimately rest upon a principle of an inductive nature. In examining the language of any argumentative book, the final major premiss will be found to be the conclusion of a prior syllogism, and that the major premiss of the one preceding it, and so on, until you arrive at a proposition which is not the conclusion of any prior deduction, but which is taken as self-evident, as an axiom or postulate. How is this first principle derived, supposing that it is not the conclusion of another syllogism? From experience, say they, who maintain that axiomatic principles are merely generalizations of experience, whilst others affirm that there are certain principles of the mind above sense, and not derived from any experimental observation.

R

Two kinds of Induction.—There will be therefore, according to some authorities, two kinds of Induction. 1. Experimental, resting for its support on a generalization of experience; and—2. Transcendental, based upon certain, a priori, principles. The word induction has been used, however, in various senses, and an instructive chapter might be written on these variations, and whether they refer to different processes, or merely to different points of view,—whether, in fact, there is any real difference between (say) the induction of Aristotle and that of Bacon. Referring our readers for a complete account of this interesting discussion, to the authors who have specially treated of it, we shall proceed shortly to explain the various uses of the word induction; and then give the views held on this subject by one of its most able exponents, Mr. J. S. Mill.

1. Induction according to Aristotle.—We have induction as used by Aristotle, and here we may remark that the reproach sometimes addressed to that philosopher of an exclusive preference for the syllogism, is so far unfounded that in the same passage, and the same line, he mentions both processes, giving in fact the priority to induction. "The ground of our belief of any assertion must rest upon induction or deduction;" and he then proceeds to say that the first is the more persuasive, and the latter the more cogent, for the first demands our assent generally on the ground of actual experimentation, and so is the more calculated to persuade an observer, whilst the latter is the more cogent, for when the premises are admitted the conclusion must follow.

Deduction, as we have seen, proves the minor of the major by means of the middle; induction derives the major from a comparison of the minor and the conclusion; for instance, in the syllogism, All animals are mortal; the horse is an animal: therefore the horse

is mortal,—we prove that the term mortal can be predicated of horse, because each of the terms, horse, mortal, agrees with a third notion, animal ; but how to establish the major, All animals are mortal, becomes now the question.

Can we, from a comparison of the terms, " The horse is an animal :" " The horse is mortal," infer that " All animals are mortal ?" Certainly not. Some conclusion may be drawn, but not this : we should be warranted in saying that " Some animals are mortal," but not that all are so. To prove a general conclusion, the subject of the conclusion, or minor term, must be exactly equivalent to the middle, which is rarely the case, and not so in the above example, for in the proposition, The horse is an animal, the predicate is not distributed, *i.e.*, we cannot convert simply and say, Every animal is a horse. It will be seen from this that induction in the sense of Aristotle, has a strong resemblance with analogy, and that the cogency of an induction will depend upon the force of the resemblance, and this was the sense in which it was understood by the schoolmen. Induction, says Abelard, is that argument in which one derives from particulars the proof of another similar particular.

2. Baconian Induction.—We have now to consider shortly the Baconian method, which has generally been placed in opposition to that of Aristotle, though an acute writer* of modern times has considered that the two are almost identical, and that it was the induction of the schoolmen that Bacon combatted, and not that of Aristotle. Liebig has gone further than this, and has asserted that when the two differ, it is rather Aristotle that is right, and Bacon who is wrong. Leaving these considerations, we proceed to remark that the schoolmen observing the difficulty there was

* Remusat.

in proving the proposition, "All animals are mortal," from the terms, "The horse is an animal," the "horse is mortal," endeavoured to attain the result by what was called *per simplicem enumerationem*, that is, an enumeration of all the individual species coming under the term animal, to which mortality is applicable.

It was to this method that Bacon objected, on the ground of its fallaciousness, since one never could be sure that an important instance had not been omitted. It was the aim of Bacon to account for a given phenomenon by some one instance of such efficacy to prove at once the required connection. This he called a *prærogativa instantia*.

In carrying out the research, the methods of *exclusion and of varying the circumstances* were chiefly employed. Was the investigation, for instance, about the cause of heat, Bacon proceeded to arrange in parallel columns all the causes of heat and cold? He then struck out on each side the causes which seemed to balance each other, until he arrived at a residium, which he held to be the cause, or causes, of the given phenomenon. If any doubt then remained, he would proceed to vary the circumstances, *i.e.*, he would remove some one of the antecedents, and substitute fresh ones, and then observe what effects followed, and so arrive at a certainty as to the final cause.

3.—Induction according to Reid.—The word induction is employed by Reid and the Scotch school to denote the principle which gives to experience its force and value, such as the intuitive perception that the future will resemble the past under like conditions.

4. Induction according to Royer-Collard.—Induction is employed by Royer-Collard, an eminent follower of Reid, to denote the method by which we transfer out of ourselves in perception what we have previously *observed in* ourselves.

5. View of Remusat.—The term is also employed by Remusat, and other philosophers, to denote the knowledge we possess of all notions transferred from ego, or mind, to the non-ego, or world of matter.

Induction in the Syllogistic form.—Any induction can of course be made to assume the syllogistic form when it will appear, according to Whately, as a syllogism in the first figure, or as others prefer, in the third figure.* If the conclusion appears as a general law, the syllogism would, of course, be in the first figure, but it is a grave question whether a purely logical induction will warrant a universal conclusion at all, for unless we admit of a higher or transcendental logic as the source of propositions not derived from experience, generality not universality, is the most that can be predicated of a purely empirical induction.

Induction according to Mill.—We now present our readers with a brief sketch of the views of induction held by Mr. Mill. To do so at any length, or at all adequately to examine the system of this philosopher, would swell our book to unreasonable dimensions; and on the other hand, totally to pass by the theory of the most eminent exponent of the science, would be equally impossible. We shall endeavour then to steer a middle course by giving such a brief account of the matter as may be sufficient for the purpose of the ordinary student, and induce the more diligent to derive further information from the works of the author.

Induction is variously defined by Mill as "the operation of discerning and proving general propositions," "as the operation of the mind, by which we infer that what we know to be true in a particular case, will be true in all cases which resemble the

---

* *See* Appendix, Note I.

former in certain assignable respects. In other words, induction is the process by which we conclude that what is true of certain individuals of a class, is true of the whole class, or that what is true at certain times will be true in similar circumstances at all times, and finally he summarily defines it as "Generalization from Experience." The universal fact, which is our warrant for all inferences from experience, has been described by different philosophers in different forms of language, that the course of nature is uniform, that the universe is governed by general laws, or our intuitive conviction that the future will resemble the past, so that whatever may be the proper mode of expressing it, the proposition that the course of nature is uniform, is the fundamental principle or axiom of the inductive process.

Uniformity of the Course of Nature.—In contemplating, however, the uniformity of the course of nature, we immediately observe that the uniformity in question is not properly uniformity, but uniformities. The general regularity results from the co-existence of partial irregularities, and the first point to be noted in regard to what is called the uniformity of the course of nature, is that it is itself a complex fact compounded of all the separate uniformities which exist in respect to single phenomena.

These various uniformities when ascertained by what is regarded as a sufficient induction, we call in common parlance, *Laws of Nature.* The phenomena of nature exist in two distinct relations to one another, that of simultaneity, and that of succession.

Cause and Effect.—Every phenomenon is related in a uniform manner to some phenomena that co-exist with it, and to some that have preceded, and will follow it. The notion of cause is at the root of the whole theory *of induction*, but it is seldom, if ever, that this un-*variable* sequence subsists between a consequent and a

single antecedent, but between a consequent, and the sum of all the antecedents.*

Mill illustrates this by the example of man, who dies after eating a particular dish, which is therefore supposed to be the cause of his death. This, however, would not necessarily be so, for before you could assert that this dish caused his death, you must eliminate every other possible antecedent, and determine that his state of health was such at the time that he would not have died if it had not been for the repast he had taken.

The real cause is the whole of the antecedents, and we have no right, philosophically speaking, to give the name of cause to any one of them, to the exclusion of the rest.

Composition of Causes.—Mill then proceeds to consider what he calls the composition of causes, and these he finds to be of two kinds, *Mechanical* and *Chemical.*

The mechanical is when the effect is equal to the sum of the antecedents considered separately, and is often called by the term *Composition of Forces.*

The second, or chemical, is when the effect is heterogeneous to the causes, *i.e.,* when something is produced entirely different to the antecedent causes, just as when by mixing two substances, you produce a third with properties entirely different from those of either of the two substances separately, or both of them taken together, as water contains no trace of the properties of hydrogen or oxygen.

Object of Inductive Logic.—To ascertain what are the laws of causation which exist in nature, is the chief object of inductive logic, and this we effect by means of *Observation* and *Experiment.*

The latter, when it is possible to use it, possesses

* *See also* Appendix, NOTE K.

obvious advantages over the former; it not only enables us to produce a much greater number of variations in the circumstances than nature spontaneously offers, but also in thousands of cases to produce the precise sort of variation we are in want of for discovering the law of the phenomenon ; but experiment is not always open to us. We can take a cause, and try what effect it will produce, but we cannot take an effect and try what it will be produced by. We can only watch till we see it produced, or are enabled to produce it by accident.

We cannot at our choice obtain consequents as we can antecedents, under any set of circumstances, compatible with their nature. If nature happens to present us with instances sufficiently varied in their circumstance, and if we are able to discover either amongst the proximate antecedents, or among some other order of antecedents, something which is always found when the effect is found, however various the circumstances, and never found when it is not, we may discover by mere observation, without experiment, a real uniformity in nature.

Four Methods of Experimental Inquiry.—Mill then proceeds to treat of the four methods of experimental inquiry. 1. The Method of Agreement. 2. The Method of Difference. 3. The Method of Residues. 4. The Methods of Concomitant Variations.

1. Method of Agreement.—The *Method of Agreement* rests upon this canon: if two or more instances of the phenomena under investigation have only one circumstance in common, the circumstance in which alone all the instances agree, is the cause [or effect] of the given phenomenon.

2. Method of Difference.—The *canon of the Method of Differences is as follows:* if an instance in which the phenomenon under investigation occurs, and an instance *in which it does* not occur, have every circumstance

in common save one, that one occurring only in the former, the circumstance in which alone the two instances differ, is the effect, or the cause, or an indispensable part of the cause of the phenomenon.

3. Canon of the Method of Residues.—Subduct from any phenomenon such part as is known by previous inductions to be the effect of certain antecedents, and the residue of the phenomenon is the effect of the remaining antecedents.

4. Canon of the Method of Concomitant Variations.— Whatever phenomenon varies in any manner whenever another phenomenon varies in some particular manner, is either a cause or an effect of that phenomenon, or is connected with it, through some fact of causation.

Conjoint Method of Agreement and Difference.—In addition to these four canons, Mill promulgates another, applicable to the conjoint method of agreement and difference, which is an extension and improvement of the method of agreement.

If two or more instances in which the phenomenon occurs have only one circumstance in common, whilst two or more instances in which it does not occur, have nothing in common save the absence · of that circumstance, the circumstance in which alone the two sets of instances differ is the effect or the cause, or a necessary part of the cause of the phenomenon.

APPENDIX I.

Note A.

The method of logical definition does not appear to have been used by Aristotle; his definition would rather appear to be an attempt to express what Mill calls the whole connotation of the term. He usually selects some general term, under which the term to be defined appears to be included, and then adds such an enumeration of the properties involved in it as are sufficient for his purpose. The following extract from the 2nd Book of the Ethics, ch. v., will show his method of searching for definitions:—" Since then the qualities which have their origin in the soul are three— Passions, Capacities, and Habit,—Virtue must be one of these; it cannot be passion, because we are not called good or bad according to our passions, but according to our virtues and vices. Virtue also implies deliberate preference, which passion does not, and we are said to be moved by our passions, but disposed by our virtues and vices. Virtue is not a capacity, because we are not all good or bad, nor are we praised in reference to our capacity. Moreover, our capacities we have by nature, but we do not become good or bad by nature. If, then, virtues are neither passions nor capacities, it remains that they are habits."

The following definitions are from this author :—

Virtue is a habit attended by deliberate preference, in the relative mean, defined by reason, and as a prudent man would define it.

Prudence is a true habit joined with reason, which is practical on the subjects of human good and evil.

Courage is a mean state in reference to the subjects *of fear and* confidence.

Temperance is a mean state on the subject of pleasure.

Magnificence is appropriate expenditure in great matters.

Remarks about definition are interspersed throughout the works of Cicero, but his leading views on the subject are found in the 5th, 6th, and 7th chapters of the Topics. After defining definition as a statement which explains the nature of the definition (*oratio quæ id quod definitur explicat quid sit*), he proceeds to treat of two kinds, mentioning that there are other kinds, which he passes by. The first kind of definitions, that of things having actual parts, as a farm, a house, furniture, &c., resembles the physical definition of the schoolmen. The second kind of definition is that of mental conceptions. The first kind is made by the process called partitio, *i.e.*, the actual separation of the definitions into its component parts, and the last by an enumeration of the species or forms coming under the term defined. His method for hunting for definitions is not dissimilar from that of Aristotle. When you wish to define, he says, you must, according to the precepts of the ancients, take some quality which the subject to be defined has in common with other terms, and continue adding on until you arrive at a suitable definition [proprium] applicable to the definition, and to nothing else. What is, he continues, an "Inheritance?"—something of value? This it has, in common with other terms, for there are many kinds of valuable possessions,—Which comes to any one by the death of another? That is not the definition, for things of value of the dead can be held in many ways without inheritance, — Lawfully? Now the definition seems tolerably complete, so that we may define inheritance as a possession of value, which comes to us lawfully by the death of another; yet one thing is wanting, that it should be left by Will, or held by prescription.

The following definitions are from Cicero :—

" Prudence, the art of living," and in another place, " the knowledge of things good and evil, and which are good, and which are evil."

" Truthfulness is that by which things past, present, and future, are said as they are."

"Justice is that which distributes what is right to each."

We may lastly here notice an ambiguity in the word Accidental. Accidental definition in the sense of Aldrich is a definition by properties, for accidents cannot be employed in the definition of a species. Mill, however, allows of the occasional use of Definition by Accidents.

Note B.

ON CONCLUSIONS FROM PROPOSITIONS EITHER PARTICULAR
OR LESS THAN GENERAL.

Professor de Morgan was the first to point out that
a conclusion can be sometimes drawn from premises,
both of which are particular, or at least less than
general, and therefore logically invalid, as offending
against the rule that no conclusion can be drawn from
particular premises. Of this kind are the following
apparent syllogisms :—

> Two-thirds of the Bar are good lawyers;
> Two-thirds of the Bar are good logicians:
> Some good logicians are good lawyers.

> Three-fourths of the army were Prussians;
> Three-fourths of the army were slaughtered;
> Some who were slaughtered were Prussians.

A full discussion of this subject would take up more
room than can be devoted to it here, but is there in
reality any logical unsoundness in these arguments ?—
and are not the first two propositions equivalent to
general propositions? Taking our second example as
an instance, we see that it is predicated of three-
fourths of the army that they were Prussians, and
that they were slaughtered. The quality then or
circumstance of three-fourths of the army was that
they "were Prussians," and "were slaughtered," and
so the argument might be made to fall in the third
figure, and the mood Darapti :—

A. The circumstance of three-fourths of the army
was that they were Prussians;

A. The circumstance of three-fourths of the army
was that they were slaughtered;

I. Some who were slaughtered were Prussians.

Note C.

Principle of the second Figure—Dictum de Diverso. —If a certain attribute can be predicated affirmatively or negatively of every member of a class, any subject of which it cannot be predicated does not belong to that class.

Principles of the third Figure — (*a*) Dictum de Exemplo.—If a certain attribute can be affirmed of any portion of the members of a class, it is not incompatible with the distinctive attributes of that class.

(*b.*) Dictum de Excepto.—If a certain attribute can be denied of any portion of the members of a class, it is not inseparable from the distinctive attributes of that class.

Fourth Figure—(*a.*) If no M is B, no B is this or that M. (*b.*) If C is, or is not, that B, there are B's which are not C.

The natural use of the second figure, according to this author, is for the discovery and proof of the differences of things, that of the third, for the discovery and proof of examples and exceptions.— *Appendix in Mansel's Edition of Aldrich.*

NOTE D.

ON THE VALUE OF LOGIC.

There is hardly a more remarkable example of a reaction at once popular and scientific, than as regards the estimation in which logic is held, contrasted with the opinions all but universally entertained, not many years ago, when Whately even thought it necessary to defend the retention of the study at Oxford, and Remusat to apologise for the mention of Aristotle and the syllogism. The reaction commencing in Germany, soon made its way to this country, and the claims of logic have not only been vindicated by the publication of many excellent works, but also by the increased attention now paid to it at all the universities. It is hardly necessary, therefore, to enter into any great elaboration of detail to prove the importance of the intelligent study of the science. As an important branch of the science of Pneumatology, dealing with the conditions under which the forms of thought become expressed in language, the very existence of logic vindicates its claim to attention. With regard to its practical uses in scientific discovery, science itself is nothing but a search into the unknown, and whatever aids the mind during this investigation, cannot be but highly advantageous. Now this is just what logic does. As a formal science, it furnishes valuable rules, applicable both to the inductive and deductive methods of inquiry. The rules for division and definition, the enumeration of the leading fallacies, the syllogistic process itself, by which we are enabled to test the validity of our own conclusions, and of those of other people, the methods of experiment and observation as applied to inductive logic, are a help to scientific discovery, which he best appreciates who has used them to the most advantage.

Nor is logic less useful as an ordinary branch of education. We are continually persuading and influencing others, and ourselves receiving the reflex action of our surroundings.

That knowledge then cannot but be useful which puts us constantly on our guard against fallacious reasoning, and furnishes us with a means for testing its validity, whether in books, speeches, or sermons. It was from this notion of its applicability to all kinds of matter, that the ancient logicians ventured to style it the Ars Artium.

We are met sometimes with the objection that persons are often able to detect a fallacious argument, or expose an unsound mode of reasoning without the aid of logic. Undoubtedly so, but then it must be remembered that this detection of fallaciousness, is usually a very long process, and more often is the unsoundness seen, than the ability exhibited to explain in what the unsoundness consists. By the rules of logic a man may do almost instinctively, and in a few moments, what it would require unaided reason, much time and a great stretch of thought, to accomplish.

Note E.

To show the connection between logic and philosophy
the objects of human knowledge must be briefly
considered. These are :—

1. Matter, or nature in the general sense of the
term, which is the province of that science to which
the various names of physiology, natural Philosophy,
and philosophy of the Real, have been given.

2. Mind, or the philosophy of the Ideal, which is
the province of the science of Pneumatology. These
sciences would form an exhaustive division of the
possible objects of knowledge were it not that the dual
nature of man, as a compound of soul and body,
requires a third division, Psychology, which treats of
man as a being with an immortal soul, and an organic
body. Logic, as conversant with the pure forms of
thought, belongs to the second division, Pneumatology ;
but as thought is exercised in the compound, man, it is
also closely connected with psychology.

Pneumatology has been divided into three divisions,
each connected with a leading and innate idea—1.
Logic, which treats scientifically of truth. 2 Ethics,
or moral philosophy, which is conversant with the idea
of goodness or virtue. 3. Æsthetics, which treats of
the beautiful in nature and art.

Note F.

One of the earliest divisions of logic was into logica docens, or formal logic, and logica utens, or practical logic. The first comprehended the ordinary precepts of the science, and was considered under the three heads of simple terms, judgments, and reasoning: the latter, the practical application of these principles, which from an early period received also the name of method, or methodology, and subsequently of applied logic. Another division much used on the continent, is into analytic and synthetic logic; analytic being that which analyses the mental processes considered separately; synthetic, that which has for its object thought as a whole. In this latter sense, it is considered as synonymous with demonstration, science, synthesis, method. Analysis and synthesis are the processes alluded to by Aristotle in the first books of the Ethics, under the expressions λόγοι ἐπι τὰς ἀρχας (analysis), and λόγοι ἀπο των ἀρχων (synthesis) In treating a subject analytically, you commence from the most obvious facts or phenomena, and trace these back to their first principles or causes, whilst the synthetical method begins from first principles, and works them out to their results; but Mansel has well pointed out that these terms are continually interchanged, and that according as we look to the comprehension or extension of terms, we may regard the genus as a part of the species, or the species as a part of the genus.

Note G.

APPLIED LOGIC.

In a preceding note we have treated of the division of logic into formal or pure, and practical or applied. Applied logic, in the words of Thomson, teaches " the application of the forms of thinking. When the views we take of objects are substantially correct, when our thoughts correspond with the facts, we are said to be in possession of the truth." The attainment of truth then being the object of Applied logic, philosophers have endeavoured to lay down certain principles which may aid the mind in the research after it. These are :—

1. A principle which has often been considered as two separate principles, viz., the principle of Contradiction, "that you cannot affirm and deny the same object of the same object at the same time," and that of Identity, that "thoughts which agree can be affirmed of the same object;" but in reality these principles may be considered as one, for to prove the truth of an assertion is equivalent to a demonstration that it does not contain any contradiction.

2. Principle of a Sufficient Reason, first introduced by Leibnitz, as that of contradiction was by Aristotle, viz., "that for every effect or phenomena in mind or matter, there must be a cause, or sufficient reason."

3. The principle of the Excluded Middle is, that a given judgment must be true, or its contradictory. There is no middle course,

The principles of Contradiction and Identity contain the forms of thought affirmatively or negatively considered. The principle of the Excluded Middle enunciates that beyond these forms of affirmation and negation there is nothing else, and the principle of Sufficient Reason requires a valid reason for our affirmations or denial.

Note H.

When two judgments are so connected with each other that the truth or falsity of the one necessitates the truth or falsity of the other, the inference is said to be immediate; thus in subaltern opposition the proposition Some men are mortal, is an immediate inference from All men are mortal. By some logicians, immediate judgments are used also to denote those furnished us immediately by the senses. When, however, the subject and predicate of a proposition are not so evidently connected as at once to be admitted, we inquire into their agreement or disagreement by a separate comparison with a third notion, and the inference is said to be mediate.

Formal consequence is when the conclusion of a syllogism results from the premises by the mere force of the terms. Material, when some attention to the matter is necessary to perceive the connection. Pure logic has solely to do with formal consequence, as the meaning of the propositions cannot be taken into account, but is applied to logic as connected with the search after truth. The consequence is chiefly material. Whilst, however, attention to the matter is necessary to perceive the force of the argument, the reasoning, if correct, can be thrown into the symbolic form, and thus the material will coincide with the formal consequence.

Note I.

ON INDUCTION ACCORDING TO WHATELY AND ALDRICH.

It has been mentioned in the text that induction, according to Whately, assumes the form of a syllogism in the first figure. This syllogism is in the mood barbara, with the major suppressed, which represents in his view the general principle on which the induction is based. Expressed fully, the syllogism would stand as follows :—

> That which belongs to this, that, and
> the other magnet, belongs to all;
> Attracting iron belongs to this, that,
> and the other magnet:

Therefore—It belongs to all.

Aldrich, on the other hand, says that induction is a kind of enthymeme, or syllogism in barbara, with the minor suppressed, as :—

> This, that, and the other magnet,
> attracts iron :

Therefore—Every magnet does so.

The suppressed minor being :—

All magnets are this, that, and the other,

Note J.

According to the ancient writers, each of the three operations of the mind—apprehension, judgment, and reasoning—had its special defect, for simple terms might be indistinct, propositions false, and reasoning erroneous. The last defect [mendosa collectio] logic completely remedies by furnishing in the syllogism a type and test of correct reasoning ; but the other two it can only partially remedy, for the indistinctness of an apprehension may proceed from causes connected with language, and the truth or falsity of a proposition can only be ascertained by a knowledge of the subject-matter whence it is taken. Yet by certain practical rules which it lays down in reference to the division of words, on division, definition, and the nature of propositions, logic does, to some extent, furnish practical remedies for the defect of the other operations.

Note K.

The reader who has paid any attention to the sketch of the system of Mr. Mill, and to the extracts from Aristotle, can hardly fail to be struck with the many points of resemblance, amidst many diversities, between philosophers so remote in point of time. With both, philosophy resolves itself into an inquiry as to the theory of causation. As a note, therefore, on the chapter, a brief account is appended of Aristotle's doctrine of cause. Causes are of four kinds, the material, the formal, the final, and the efficient, and this last he subdivides into necessity, nature, art, chance, and everything operating by or through man. The following is the manner in which he himself explains his theory :—

"In one manner that may be called a cause out of which, existing as a part of it, anything is compounded. Thus is Brass the cause of a statue ; Silver, of a cup. In another way, the form and exemplar of anything is its cause, and this is the definition, or formal cause. Add to this cause that other from whence is the original principle of change, or ceasing to change, as the person who deliberates, is the cause of the result; the father the cause of the son; and in general, the efficient of the thing, the power changing of the thing changed. Besides these causes there is that also which is considered as the end that is for the sake of which the thing is done. Thus, the cause of exercising is health ; for if it be asked why he uses exercise, we say, to preserve his health, and having said this much, *we think* we have given the proper cause."—*Aristotle, Natur. Auscult.*, l. II. c. 3.

APPENDIX II.

1. Distinguish the provinces of logic, rhetoric, and grammar.
2. State and compare the various arrangements of the categories which have been proposed by logicians.
3. " A syllogism has three, and only three terms."— Show the validity of this rule.
4. Explain the dilemma, and give an example.
5. What fallacies are of the most frequent occurrence in practice ?—Give instances.
6. In what sense is logic an art of reasoning ? Why is that account of it insufficient ?
7. Explain the word category—What objections have been made to the categories of Aristotle ?
8. Explain the dictum de omni et nullo. How has syllogism been deduced from it ?
9. Give some examples of " the undistributed middle," and of popular fallacies, which can be traced to it.
10. Explain and illustrate the words induction and deduction. Why is experimental philosophy commonly called also inductive philosophy ?
11. State and illustrate the nature of a definition.
12. What are the different views as to the logical value of the syllogism ?
13. What experimental methods are applicable to the determination of the true antecedent in phe-

nomena where there may be a plurality of causes?

14. Classify fallacies.
15. What is Mr. Mill's definition of induction? Is induction so defined a logical process at all?
16. In what class of syllogisms is I inadmissible as a major premiss, and why?
17. Given O as the major premiss, determine the mood and figure. Given O as the minor premiss, determine the mood and figure. Given A as the conclusion, determine the mood and figure.
18. State the substance of the controversy between Realism, Nominalism, and Conceptualism. What is the characteristic defect of each system?
19. Distinguish between the attributive and quantitative import of propositions, and state what is their primary import.
20. State the distinction between science and art. Define logic as a science and an art respectively. In what respect, if any, is it entitled to be considered as ars Artium?
21. State Mr. Mill's argument in support of his position that syllogism is not a process of inference.
22. Is the modality of propositions purely a logical, or extra-logical consideration?
23. Reduce in full, by different methods, Baroko and Bokardo.
24. Explain shortly the following logical terms—concept, connotative, abstract, predicable, contrary, figure, illicit process, dilemma.
25. Define the province of the science of logic.
26. Define a proposition. How are propositions classified for the purposes of logic.
27. State and exemplify the experimental methods *according to* Mr. J. S. Mill.

QUESTIONS SET IN LOGIC AT THE LONDON UNIVERSITY
EXAMINATIONS.

1. Explain analysis, synthesis, abstraction, axiom, maxim, equivocal.
2. What is the use of the scheme of opposition?
3. Why cannot an affirmative conclusion be drawn in figure 2?
4. Construct an argument in Ferison, and reduce to figure 1.
5. Distinguish the dilemma, properly so called, from other forms of argument which resemble it.
6. Compare experiment with observation as a means of inquiry.
7. Take Mill's four experimental methods, and exhibit the inductive character of each. Are they all equally inductive?
8. Has the mode of reasoning from particulars to particulars got any recognition from formal logicians?
9. Distinguish complete from incomplete definitions.
10. Give the special rules for the figures, and the reasons for them.
11. State and exemplify the joint method of agreement and difference.
12. Exemplify fallacies a priori, and fallacies of confusion.
13. Is the syllogism a process of real inference, or what is it?
14. Distinguish species—1. In the popular; 2. In the current scientific; 3. In the logical sense,—and show by examples how the different meanings may clash.
15. Why we may pronounce with more certainty that the sun will rise to-morrow than five thousand years hence.

SELECTIONS FROM OXFORD EXAMINATION PAPERS.—
MODERATION PAPERS.

(*Pass.*)

1. How may logic be defined ?   Is it a science or an art?

2. Explain fully what is meant by heads of predicables.

3. What is the object of definition?   Define logically the following words—house, school, college, minister, governor, hypocrisy, treason.

4. Enumerate the various kinds of opposition —which is the strongest form, and why?   Illustrate by examples.

5. Define syllogism.   Show by example what is meant by illicit process, and undistributed middle term.

6. Construct syllogisms to prove, or disprove, the following—*a*, trade unions ought to be made illegal ; *b*, my own college is the best in the university ; *c*, logic is not a profitable study.

7. What is meant by reduction ?   Reduce to moods of figure 1,—fesapo, disamis, baroko, camenes.

8. To what rule must conditional hypothetical syllogisms conform ?   Show by examples what logical faults are involved in a violation of these rules.

9. Distinguish between induction and exemplum. Can induction be represented in a syllogism ?

10. Explain the following.—Subaltern moods, material and formal consequence, metaphysical and logical wholes, nouns primitive and negative, *sorites,* circumstantial and direct evidence.

11. In what different relations can the subject and predicate of a proposition stand to each other?

12. Explain proposition, inference, equivocal term, summum genus, inseparable accident, contrary opposition.

13. The meaning of the following statements,—*a*, logic is the formal science of the laws of thought; *b*, negative propositions distribute their predicate; *c*, the third figure is that into which negative arguments naturally fall; *d*, differentia expresses the formal part of the subject.

14. Define fallacy, and illustrate the argument in a circle, fallacia accidentis, a non causa pro causâ, compositio, the fallacy of Achilles.

15. Convert the following,—*a*, familiarity breeds contempt; *b*, he jests at wounds who never felt a scar; *c*, only the honest ultimately prosper; *d*, envious men are disliked

16. Give the rules of hypothetical syllogisms, with instances.

17. Define and divide any common term, showing how the ordinary rules for division and definition hold good.

18. Construct syllogisms in camestres, fesapo, bramantip, baroko, and reduce them to the first figure.

19. What is meant by the quantity and quality of syllogisms?—the mood and figure of syllogism? —illicit process of major?—constructive dilemma?

20. State the following arguments in logical form,— *a*, this man is wicked, and cannot therefore be happy; *b*, inductio est enthymema quoddam nempe Syllogismus in barbara, cujus minor reticetur; *c*, induction proceeds from the known to the unknown.

21. Construct arguments to illustrate the following,—
sorites reductio ad absurdam; arguing in a
circle; fallacia a dicto secundum quid ad
dictum simpliciter.

22. Explain abstract, univocal, categorical, subaltern,
opposition, imperfect moods.

23. Distinguish between denotation and connotation,
singular, collective, common terms, verbal and
real propositions, induction, deduction

24. Give rules for division, with instances of good and
bad divisions.

25. Enumerate, with examples, the various forms of
definition. Define the following terms,—logic,
syllogism, university, club, conservative, dic-
tionary, hypochondriac, race-horse, insurance.

26. Give the rules for the distribution of terms in a
proposition, with the exceptions.

27. Put the following in the form of logical propo-
sitions,—*a,* " he can't be wrong whose life is in
the right; " *b,* " all, save the spirit of man, is
divine ;" *c,* 'tis use alone that sanctifies expense ;
d, no one can be less amusing than the
chancellor of the exchequer when he is didac-
tic.

28. Explain, with instances, illicit process of the major,
subcontrary-opposition, conversio per accidens,
reductio per impossibile.

29. How is logic practically useful in education ?

30. In how many ways may propositions be converted ?

31. What rules should be observed in performing
logical division ? Divide the following,—uni-
versity, church, undergraduate, virtue, states-
men, science, art.

32. What conclusions can be drawn in the second and
third figures respectively. On what grounds
would you reject the moods A, E, I, A', O, O,

in the first figure, and A, A, A, E, A, E, in the fourth figure?

33. Distinguish accurately between genus species, differentia, and illustrate your statement by examples.

34. Define logic, and state what you think of the following definitions,—Logic is the art of expressing thoughts in words—Logic is a help to correct reasoning.

35. Define exemplum, enthymeme, and induction, and illustrate definition.

36. Give instances of the argument called sorites. To what logical rules ought it to conform, and why?

37. What divisions have been made of fallacies? Explain, with instances, the fallacies of amphibolia, petitio principii, ignoratio elenchi, divisio.

38. Why can no conclusion be drawn from two particular, or two negative, premises?

39. Reduce to moods of figure 1,—Cæsare, bramantip, bokardo. What is the use of reduction?

40. Draw out in words a complex constructive dilemma, and rebut it.

41. Explain the following,—denotation and connotation of terms, singular, common, and collective names, mediate, and immediate inference, summum genus, infinia species, quæsitio, predicabile mendosa collectio, opposition of propositions.

X.

1. Define Nominalism, scholar, responsibility, magnitude, accident, philology.
2. Explain second intention, category, predicable.
3. Discuss " modality belongs to the copula."
4. What is an axiom ?
5. What are the fundamental axioms on which the conclusiveness of the syllogism depends ?
6. What is meant by the distribution of the predicate? To meet what difficulty was it propounded? To what objection is it open ?
7. Give instances of contradiction, fallacy, *a dicto simpliciter ad dictum secundum quid.* Argument in a circle.
8. How far are fallacies extra-logical ?
9. What is the difference between an analytic and a synthetic treatment of logic?
10. Distinguish between common and collective, abstract and attributive, denotative and connotative terms.
11. All definitions are of names, and of names only. Examine this doctrine.
12. Define species, diet, money, gravitation, consistency, success, merit.
13. Examine the theory that predication consists in referring something to, or excluding something from, a class.
14. Frame instances of contradiction, immediate inference, syllogism in felapton, paralogism.

FIRST PUBLIC EXAMINATION.

1. How would you answer the objection that logic is of no practical use ?

2. Definitio alia nominalis, alia realis, realis iterum vel accidentalis, sive descriptio vel essentialis. Explain and criticise this statement. What is the object at which definition aims ?

3. State any different views which may have been held on the import of propositions. Is the relation of subject and predicate the same in all propositions ? Give examples.

4. In what different senses have logicians spoken of connotation and connotative names.

5. Distinguish species, differentia, proprium, accidens. Give illustrations. What value do you attach to the distinctions in question ?

6. Can every argument be put into a syllogistic form ? Is anything gained by the change ?

INDEX.

·

•